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DEPARTMENT OF HEALTH
SPECIAL REPORT SERIES

31

SURVEY OF THE PUBLIC DENTAL HEALTH SERVICE
IN NIUE
AND PLAN FOR DEVELOPMENT

Issued by the National Health Statistics Centre
of the
Department of Health, Wellington.



1968



New Zealand

DEPARTMENT OF HEALTH

SURVEY OF THE PUBLIC DENTAL HEALTH SERVICE IN NIUE AND PLAN FOR DEVELOPMENT

by
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Wellington.

December 1965

SPECIAL REPORT No. 31

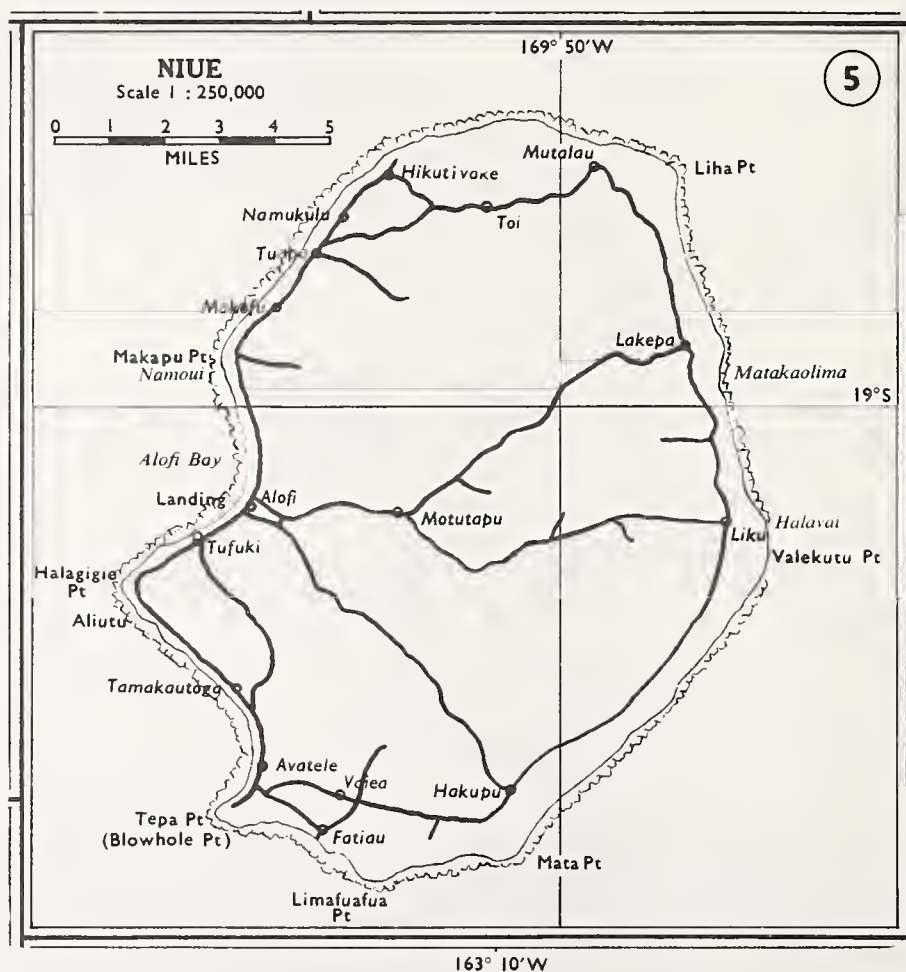
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Department of Health, Wellington
1968*

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MAP SHOWING LOCATION OF NIUE
 IN THE PACIFIC AREA



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FOREWORD

Before the advent of modern civilisation dental disease was relatively unknown in the South Pacific Islands. However as in the case of many other societies when their natural way of live has become more sophisticated the people of these Islands have undergone a marked deterioration in dental health since the turn of the century. This is unfortunate and the problem now is to remedy the situation in a region where the populations are so widely scattered and dental services so difficult to organise. It is for this reason that I was very pleased to authorise the publication of the Report on Public Dental Health Services in Niue in the Special Report Series of this Department. The Report is based on a survey of the services in Niue undertaken in 1965 by Mr J. Francon Williams, Deputy Director of the Division of Dental Health on behalf of the Department of Island Territories and at the request of the Resident Commissioner. It is the result of a great deal of time and effort by Mr Williams who from long personal experience in the Pacific Islands is particularly well qualified to evaluate the dental services in this area and to advise on their future development. Both in content and presentation the Report is a credit to the author. To be able to state in this foreword that many of his recommendations have already been implemented is a clear indication of their practical value. Mr Francon Williams is to be congratulated on producing an exceptionally useful document. It relates to a comparatively small community but because of its application to similar communities in the region it should prove a valuable contribution to dental health in the South Pacific.



D.P. Kennedy E.D., M.B., Ch.B. (N.Z.)
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PREFACE

H.—D.H. 42

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DIVISION OF DENTAL HEALTH,
P.O. BOX 2941,
WELLINGTON.

15 December 1965

The Secretary,
Department of Island Territories,
Manchester Unity Building,
Lambton Quay,
WELLINGTON.

Sir,

I have the honour to submit this Report, with Appendices, relating to the Public Dental Health Service in Niue. The Report also outlines a programme of development extending over the next ten years.

May I take this opportunity of thanking you, Sir, and the Resident Commissioner, Niue, as well as the Director-General of Health and my own Director, for making it possible for me to undertake this tour of duty for your Department.

Yours faithfully,

J. Francon Williams

J. FRANCON WILLIAMS, B.D.S.(N.Z.),
DEPUTY DIRECTOR

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INTRODUCTION

N I U E

A. DESCRIPTION

The Island is isolated, surrounded by great ocean depths, and there is no indication of any past geological relationship or land connection with other island groups^(a). It is situated some 300 miles east of Tonga, 350 miles south-east of Samoa and 580 miles west of Rarotonga (Southern Cook Group). It is roughly rhomboidal in outline and has an area of 64,028 acres or slightly in excess of 100 square miles. This area is greater than the combined land area of all the Cook Islands in the northern and southern groups.

The Island is an elevated coral outcrop with a coral reef fringing a precipitous and broken coastline. The central saucer-shaped plateau, rising to a height of 220 feet, is encircled by a narrow terrace about 90 feet above sea level.

There are no running streams and, until recently, the water supply depended on rain-water which is stored in tanks. Now bores are being put down and the supply of water has been greatly increased.

The top-soil, though fertile, is not plentiful and occurs in pockets varying in depth from 2-6 inches. The rocky and broken nature of the country makes cultivation difficult. Sharp-edged rocks, usually hidden by a dense growth of ferns, vines and other plants, cover the surface, as well as limestone rocks of various sizes, often fantastically arranged, with deep fissures and caverns.

On the upper plateau there are two main types of sub-soil. "Makatea", a pure deposit of decomposed limestone, white and granular in character, extends in places to a depth of 10 feet or more. Alone, it will not support crop plants. It is used for road surfacing, forming a hard concrete-like covering. The other type of sub-soil is of a different consistency and is red in colour. It occurs in pockets and when incorporated with top-soil can be used for cropping.

The principal crop plants are taro, yam, sweet potato, banana, paw-paw and, of course, coconut. Breadfruit trees are scarce. After approximately one year of cropping, the soil must remain uncropped for several years, say 10-15 years, to recover. During this interval, secondary growth, composed mostly of ferns and shrubs, occupies the land.

The Island is on the edge of the hurricane belt. From December to March the climate is warm and humid and there is always the possibility of serious storms. In the remaining months of the year the climate is mild and equitable. The mean annual temperature is 76.6° Fahrenheit and the average annual rain-fall is 79 inches.

B. HISTORY

When man first reached Niue is not known ^(b). Some students believe the Island has been inhabited for over 1,000 years. The first inhabitants came from Samoa or Tonga. Whether they arrived as adventuring explorers in search of a new land or were accidentally blown there by unfavourable winds is not known. There is considerable evidence, borne out by historical traditions, that there have been several subsequent migrations to Niue from Tonga. The Niueans are basically of Polynesian stock with traces of Melanesian or Papuan blood. Their hair is generally very black and quite straight (true Polynesian hair) or wavy. It is not frizzy, negative evidence of a close alliance to the Melanesian strain ^{(a)(b)}. The people bear the greatest affinity in personal appearance to the Moriori of the Chatham Islands. The same type of face is seen in the Urewera tribe of Maoris. It is probable, and has been demonstrated in the case of the Maori and Moriori by an examination of their skulls, that every branch of the Polynesian race has a slight admixture of Melanesian or Papuan blood in it ^(b).

The people speak a dialect of the Polynesian language. The dialect is peculiar to the Island but closely related to Tongan, Samoan and Cook Island Maori.

The European credited with first visiting the Island is Captain James Cook on 20 June, 1774. His party met with armed and vigorous opposition and was compelled to withdraw. Because of the hostile attitude of the inhabitants, Cook called the Island, "Savage Island", a fact not appreciated by present day Niueans.

A number of missionaries eventually went to the Island and converted the people to Christianity. A line of kings ruled more or less continuously until the Island came under the control of New Zealand, shortly after the beginning of the twentieth century. Niue was annexed under a proclamation made by His Royal Highness, the Duke of Cornwall and York, at Auckland on 11 June, 1901.

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PART IPURPOSE OF SURVEYANDORDER OF REFERENCE

These were stated in a memorandum dated 5 May 1965 addressed to the Director-General of Health from the Secretary, Department of Island Territories.

"This proposed dental survey is in response to a request made by the Resident Commissioner of Niue when he visited Wellington in 1963 and asked whether Mr Francon Williams could pay an official visit to the Island.

In support of his request the Resident Commissioner claimed that such a visit would be justified not only to stimulate the dental staff on Niue and to ensure good morale, but also to enable a check to be made on the professional techniques being employed and the equipment and stores being used, and to advise Niue on the most effective operation of their new mobile dental clinic.

The broad terms of reference of the proposed survey are:

1. To ascertain the present standard of dental health of the whole population;
2. To ascertain the categories of staff, organisation and facilities necessary to provide a minimum dental service at an ideal level for the whole population;
3. To consider the staffing necessary and to indicate as far as possible the proportion of staff which will require to have the following training:
 - (a) Dental training (including prosthetics) at the Fiji School of Medicine, and
 - (b) Local training;
4. To recommend a programme of development of the public dental health service having regard to the economic and social conditions on Niue.

It is also requested that Mr Williams visit the Fiji School of Medicine in Suva as it is some time since dental facilities at the School were visited by an officer of the New Zealand Government."

On 28 May 1965, with the concurrence of the Minister of Health, the State Services Commission approved of the visit to Niue for the purpose of carrying out a dental survey. The Commission also agreed that a visit be made to Fiji to see the dental facilities at the Suva School.

The Secretary, Department of Island Territories, was advised accordingly.

The tour of duty on Niue occupied the period 27 July to 24 August 1965.

PART IIS U R V E YEXAMINATION AND RECORDINGA. FIELD EXAMINATIONS

During the month of April 1965, in anticipation of, and in preparation for, the proposed visit by the writer, a dental survey of the inhabitants of Niue was conducted. All examinations and written records were made by Siona Talagi*, with the assistance of a recorder, Punatau Olife. Siona Talagi was instructed in the survey method wholly by correspondence. Mr M.J. Hollis**, with the help of Miss N. Kellow, undertook the preliminary statistical treatment of the data.

The examination and recording methods were similar to those used in an earlier survey of the Tokelau Islands⁽¹⁾⁽²⁾ which were based on the recommendations of the World Health Expert Committee on Dental Health⁽³⁾.

The population of Niue is just over 5,000. Of these, a sample of 1,105 persons (approximately 22% of the population) was drawn by going to each village, lining up the inhabitants by age groupings and sex and selecting every third person in each line.

The age groupings for the presentation of data for those examined were as follows:-

(a) separate tabulation for each year up to and including 14 years

(b) five year groupings as follows:

15 - 19 years

20 - 24 "

25 - 29 "

30 - 34 "

(c) ten year groupings as follows:

35 - 44 years

45 - 54 "

55 - 64 "

65 - 74 "

(d) and 75 years and over

The age and sex distribution of subjects included in the survey is shown in Table I.

* Siona Talagi, A.D.O.(Apia), Dental Officer in Charge, Public Dental Health Service, Niue.

** M.J. Hollis, B.D.S.(N.Z.), M.P.H.(Michigan), Principal Dental Officer (Research), Division of Dental Health, Wellington.

TABLE I

Age and Sex Distribution of Subjects
included in the Survey

Age	Male	Female	Total
2	27	31	58
3	26	31	57
4	33	33	66
5	31	20	51
6	24	18	42
7	23	18	41
8	22	18	40
9	23	15	38
10	15	14	29
11	13	17	30
12	20	13	33
13	19	23	42
14	19	19	38
15 - 19	42	36	78
20 - 24	35	41	76
25 - 29	35	48	83
30 - 34	26	27	53
35 - 44	41	60	101
45 - 54	31	37	68
55 - 64	12	32	44
65 - 74	13	13	26
75+	9	2	11
All Ages	539	566	1,105

B. RECORDING METHODS

All examinations were conducted using mouth mirrors and sharp sickle explorers. No X-rays were taken. The examinations were done under conditions of natural lighting in dental clinic, school rooms, etc.

1. DENTAL CARIES

The tooth was taken as the basic unit, no record being kept of tooth surface data. Each tooth was recorded as being in one of the following categories:-

- (1) Tooth present and sound.
- (2) Tooth decayed. Teeth that were filled but showed evidence of active caries around the filling or on an unfilled surface of the tooth were also included in this category.
- (3) A decayed tooth that was beyond conservative treatment and required extraction.
- (4) An otherwise more or less sound tooth that was indicated for extraction for periodontal reasons (i.e., pyorrhoea).
- (5) Tooth that was indicated for extraction because of crowding.
- (6) Tooth that had already been extracted for caries or periodontal reasons.
- (7) Tooth that had already been extracted because of crowding.

- (8) Tooth filled - no active decay present.
- (9) Teeth that were:
 - (a) unerupted
 - (b) congenitally absent (or assumed to be so from the clinical evidence)
 - (c) shed (in the case of deciduous teeth).

Status of Individual Teeth (see Fig.1)

Boxes were provided on the examination chart for recording the status of each tooth, separate boxes being provided for both deciduous and permanent teeth. The following codes were employed to record status:-

- Tick - Tooth present and sound.
- D. - Tooth decayed.
- M. - Tooth extracted.
- F. - Tooth filled.
- Dash - A tooth that was (a) unerupted, or (b) congenitally absent (or assumed to be so from the clinical evidence). Where a deciduous tooth had been replaced by its permanent successor, the deciduous box was simply left blank.

This method of examining and counting the teeth has become a standard measurement among public dental health officers, and has been well tested for validity. It can be verified independently and is therefore objective.

Since the survey was concerned primarily with assessing the treatment needs of the age groups examined the results for the deciduous teeth are expressed as "def" indices and, for the permanent teeth, as "DMF" indices. For the purpose of this Report, therefore, the lower case letters have exactly the same meaning as the corresponding parent index letters:-

- D, d = number of teeth decayed
- M, e = number of teeth extracted because of caries
- F, f = number of teeth filled

However, so that there would be some recording method for all eventualities, the above basic codes of "D", "M" and "F" were modified and further detailed as follows:-

"D" CODE

- D. - Tooth decayed but savable. This code was also used for teeth that were filled but showed evidence of active decay either around the filling or on an unfilled surface.
- DX. - A decayed tooth that was beyond conservative treatment and required extraction.
- PX. - An otherwise more or less sound tooth that was indicated for extraction for periodontal reasons.
- CX. - A tooth that was indicated for extraction because of crowding (that is, for orthodontic reasons).

"M" CODE

- M. - A tooth that had been previously extracted because of caries or for periodontal reasons.
- MC. - A tooth that had been previously extracted because of crowding.

NOTE: Within certain age limits (it would appear to be from 6 to 34 years in this survey) the DMF index approaches a true measure of the total caries experience for the individual subject or all the subjects. From the age of 35 years upwards, however, it is not possible to determine what proportion of "M" teeth had actually been previously extracted because of caries (as opposed to the proportion previously extracted for periodontal reasons).

"F" CODE

- F. - Tooth filled, no active decay present.

N.B. - The following conditions were recorded by entering a tick, where necessary, in the appropriate boxes.

2. PERIODONTAL DISEASES

At present it is not possible to adopt a universally acceptable system of classification of periodontal diseases which is based on aetiology or pathology, as this type of assessment lacks sufficient precision. However, for the purpose of international reporting, it is acceptable to assess periodontal diseases by recording clinical signs only.

Subjects with periodontal diseases may therefore be classified in two groups; those with superficial lesions who have inflammation of the gingivae only, and those with deeper lesions who have pocket formation with or without associated inflammation.

(1) Inflammation of the Gingivae (Gums)

The presence of inflammation of the gingivae was recorded when there was evidence of one or more of the following signs: redness, swelling, ulceration and bleeding.

(2) Periodontal Pockets

The subject was classified as having periodontal pockets if one or more pockets greater than 3 m.m. in depth were found. It should be emphasized that this is an arbitrary but objective criterion. In this assessment no specific attempt is made to differentiate between true pockets and false pockets.

3. CALCULUS (TARTAR)

(1) Supra-gingival calculus, i.e. calculus above the gum margin, was recorded as present if definite hard deposits were found on one or more teeth.

(2) Sub-gingival calculus, i.e. calculus below the gum margin, was recorded if it was detected on one or more teeth.

4. HANDICAPPING DENTO-FACIAL ANOMALIES

The presence of any of the following conditions was recorded:-

Cleft lip	Cleft palate
Prognathism	Retrognathism
Crowding	Spacing
Deep Overbite	Open Bite

5. DENTAL PROSTHESES

The presence of the following three conditions was recorded separately for each jaw:-

- (1) All natural teeth absent.
- (2) Remaining teeth indicated for extraction.
- (3) Wearing full artificial denture.

6. OCCLUSION

The occlusion was recorded simply as being "Normal" or "Abnormal".

7. ORAL HYGIENE

Those examined were graded as having "good", "fair" or "poor" oral hygiene. In other words whether the teeth appeared "clean", "partially clean" or "neglected".

8. TOOTHBRUSHING

A record was kept of the frequency of toothbrushing.

FIGURE I

Examination Chart used in Survey

Name.....	Age.....	Sar.....
-----------	----------	----------

Address.....

Examined at.....on.....by.....

STATUS OF INDIVIDUAL TEETH

				E	D	C	B	A	A	B	C	D	E				
8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8		
				E	D	C	B	A	A	B	C	D	E				

PERIODONTAL DISEASE

Inflammation of Gingiva ☐

Pockets ☐

Pockets ☐

CALCULUS

Supra-gingival calculus ☐

Sub-gingival calculus ☐

HANDICAPPING DENTOFACIAL

ANOMALIES

Cleft Lip ☐ Cleft Palate ☐

Prognathism ☐ Retrognathism ☐

Crowding ☐ Spacing ☐

Deep Overbite ☐ Open bite ☐

deep overbait = open bait

Other..... ☐
(Specify)

(-1000-129)

DENTAL PROSTHESES

All natural teeth absent.....

Remaining teeth indicated

Remaining teeth indicated
for extraction.....

OCCLUSION

Normal ☐ Abnormal ☐ Good ☐ Fair ☐ Poor ☐

Normal ☐ Abnormal ☐ Good ☐ Fair ☐ Poor ☐

TOOTHBRUSHING

Never ☐ Seldom ☐ Daily ☐ B. I. D. ☐ T. I. B. ☐

NOTE: The Tables have been worked out to two decimal places. No standard deviations or levels of significance have been calculated as the Tables are intended to present simply and clearly to all concerned observable trends regarding the standard of dental health of the respective age groups examined.

This Report then sets out the results of a survey of pre-school children, school children and adults. The dental diseases and conditions covered in the Report are those which constitute major public health problems in many countries, namely, dental caries, periodontal disease, calculus and absence of teeth (but this latter only in the older age groups in Niue).

PART IIICLINICAL RESULTS AND DISCUSSIONS

The examinations yielded data relevant to the following aspects:-

1. DENTAL CARIES(1) Dental Caries Prevalence

This term is used to indicate the degree of dissemination of a disease throughout the population at risk. Thus the percentage of persons with one or more carious lesions is an expression of "point prevalence rates".

Table II shows the proportion of the population with one or more "def" deciduous teeth and Table III the equivalent data for permanent teeth.

TABLE IICaries Prevalence

Point Prevalence Rates

Percentage of Subjects, by ages, with one or more
def Deciduous Teeth

Age	*Total Number of Subjects	Number of Subjects with One or More "def" Teeth	Percentage of Subjects with One or More "def" Teeth
2	58	9	15.52
3	57	36	63.16
4	66	45	68.18
5	51	43	84.31
6	42	37	88.10
7	41	36	87.80
8	40	38	95.00
9	32	23	71.88
10	13	11	84.62

* The number of subjects does not include those nine and ten year old subjects who have lost ALL their deciduous teeth.

TABLE IIICaries Prevalence

Point Prevalence Rates

Percentage of Subjects, by ages, with one or more
DMF Permanent Teeth

Age	*Total Number of Subjects	Number of Subjects with One or More "DMF" Teeth	Percentage of Subjects with One or More "DMF" Teeth
5	41	4	9.76
6	42	14	33.33
7	41	26	61.90
8	40	26	65.00
9	38	25	65.79
10	29	17	58.62
11	30	17	56.66
12	33	28	84.85
13	42	33	78.75
14	38	35	92.11
15-19	78	72	92.31
20-24	76	72	94.74
25-29	83	74	89.16
30-34	53	50	94.34
35-44	101	97	96.04
45-54	68	66	97.06
55-64	44	43	97.73
65-74	26	26	100.0
75 +	11	11	100.0

* The number of subjects does not include those five and six year old subjects who have NO permanent teeth erupted.

It will be noted in both Tables that the prevalence increases, broadly speaking, with age and that the disease is fairly widely disseminated throughout the population. It is more widely disseminated than in the Tokelau Islands⁽¹⁾⁽²⁾ but similar to that in the Cook Islands⁽⁴⁾.

However in the pre-school and school age groups there would appear to have been some overall improvement over the past 25 years⁽⁵⁾.

In 1940, 896 children were examined in the age group 4-15 years inclusive and 9.17% of those examined had all sound teeth.

In 1953, 388 children were examined in the age group 2-15 years inclusive and 11.86% of those examined had all sound teeth.

In the present survey 450 children were examined in the age group 4-14 years inclusive and 17.33% had all sound teeth.

(2) Dental Caries Experience

This term is used to express the accumulated amount of caries which has occurred at any time in the life of the individual, up to the time of examination. Once a tooth has been attacked by disease, the evidence remains to be observed, as an untreated lesion, as a filling or restoration, or as a space from which the tooth has been extracted. Thus the number of decayed, extracted and filled teeth per subject indicates "caries experience".

Table IV shows that for the deciduous teeth the mean number of "def" teeth per subject rises to a maximum of 5.40 teeth by age six and then falls as the deciduous teeth at risk are gradually replaced by permanent teeth. These figures reveal a moderate experience in the deciduous dentition.

An analysis of the "def" components, Table IV, shows that overall approximately one-third of the carious teeth have been filled. The number of extracted teeth is relatively low. The analysis is shown graphically in Figure II.

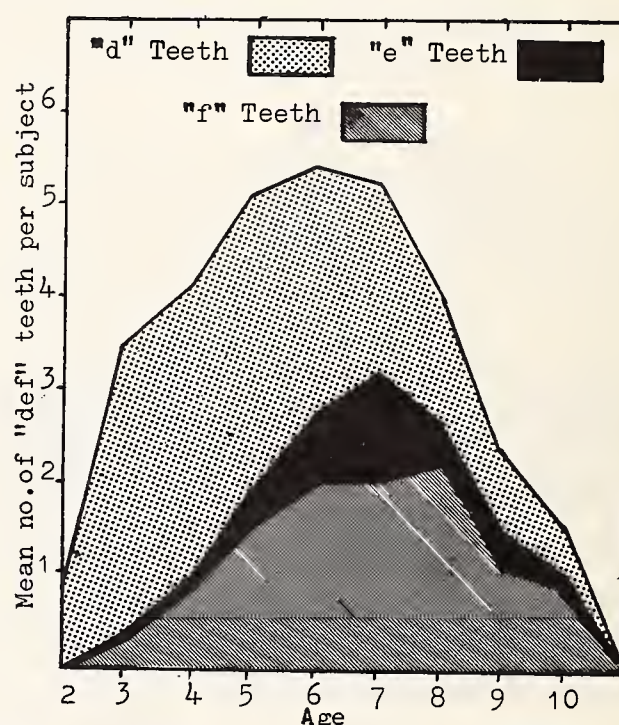


TABLE IV

Mean Caries Experience

Mean Numbers of def Deciduous Teeth per Subject

Age	Total No. of Subjects*	Total No. of Deciduous Teeth	Total No. of "d" Teeth	Total No. of "e" Teeth	Total No. of "f" Teeth	Total No. of "def" Teeth	Mean No. of "def" Teeth per Subject
2	58	1,101	40	-	-	40	0.69
3	57	1,130	179	2	13	194	3.40
4	66	1,316	204	13	52	269	4.08
5	51	978	170	17	75	262	5.14
6	42	651	114	24	89	227	5.40
7	41	518	82	43	89	214	5.22
8	40	386	47	17	93	157	3.92
9	32	194	29	12	36	77	2.41
10	13	71	8	2	11	21	1.61

* The total number of subjects does not include those older children who have lost ALL their deciduous teeth.

Table V shows that most of the decayed deciduous teeth can be treated conservatively. It would appear that the progress of the destructive carious process is slow, so that the filling of one-third of the carious lesions is sufficient to prevent the premature loss of many of the attacked deciduous teeth. Table VI supports this viewpoint.

TABLE V
Percentage of Decayed Teeth that require (1) Conservative Treatment and (2) Extraction
Data for Deciduous Teeth

Age	Total No. of Subjects	Total No. of Deciduous Teeth	Total No. of "d" Teeth	"d" Teeth Requiring Conservative Treatment		"d" Teeth Requiring Extraction *	
				No.	P.C.	No.	P.C.
2	58	1,101	40	40	100.0	-	-
3	57	1,130	179	178	99.45	1	0.55
4	66	1,316	204	202	99.02	2	0.98
5	51	978	170	160	94.11	10	5.89
6	42	651	114	109	95.61	5	4.39
7	41	518	82	78	95.13	4	4.87
8	40	386	47	42	89.36	5	10.64
9	32	194	29	24	82.75	5	17.25
10	13	71	8	8	100.0	-	-

* All the extractions were required because of dental caries.

TABLE VI
Percentage of Total Teeth Present that require Extraction
Data for Deciduous Teeth

Age	Total No. of Subjects	Total No. of Deciduous Teeth Present	Teeth Requiring Extraction	
			No.	P.C.
2	58	1,101	-	-
3	57	1,128	1	0.09
4	66	1,303	2	0.15
5	51	961	10	1.04
6	42	627	5	0.80
7	41	475	4	0.84
8	40	369	5	1.36
9	32	182	5	2.75
10	13	69	-	-

In the permanent dentition, Table VII shows that the mean number of "DMF" teeth per subject is relatively low until the age of 11 years (DMF 1.53) when there is a sudden rise to a DMF of 4.00 at age 12. This rise is due to the eruption of the second permanent molars. These teeth seem to be more affected by dental caries than do the first permanent molars which erupt at approximately 6 years of age.

There is then a long period of relatively low caries experience until the age group 45-54 years. After this age the mean number of "DMF" teeth per subject rises sharply.

TABLE VII
Mean Caries Experience
Mean Numbers of DMF Permanent Teeth per Subject

Age	Total No. of Subjects *	Total No. of Permanent Teeth	Total No. of "D" Teeth	Total No. of "M" Teeth	Total No. of "F" Teeth	Total No. of "DMF" Teeth	Mean No. of "DMF" Teeth per Subject
5	41	169	5	-	2	7	0.17
6	42	343	23	-	9	32	0.76
7	41	459	26	-	22	48	1.17
8	40	551	23	1	32	56	1.40
9	38	719	18	-	40	58	1.52
10	29	675	20	-	21	41	1.41
11	30	801	14	2	30	46	1.53
12	33	799	45	1	86	132	4.00
13	42	1,174	46	2	80	128	3.05
14	38	1,061	43	5	123	171	1.50
15-19	78	2,320	63	22	271	356	4.56
20-24	76	2,400	105	60	287	452	5.94
25-29	83	2,574	181	103	184	468	5.64
30-34	53	1,648	123	139	80	342	6.45
35-44	101	3,193	238	431	77	746	7.39
45-54	68	2,168	166	487	23	676	9.94
55-64	44	1,407	194	734	1	929	21.11
65-74	26	832	25	659	-	684	26.30
75 +	11	352	15	293	-	308	28.00

* The total number of subjects does not include those young children who have NO permanent teeth erupted.

Table VII also shows that about two-thirds of the carious teeth have been filled up to the age group 15-19 years. The number of missing teeth is negligible until after the age of 15 years. After 20 years of age the proportion of unfilled carious teeth rises and the number of missing teeth increases markedly. However, the dental treatment being provided is preventing the loss of permanent teeth up to the age of 15 years. This analysis is shown graphically in Figure III.

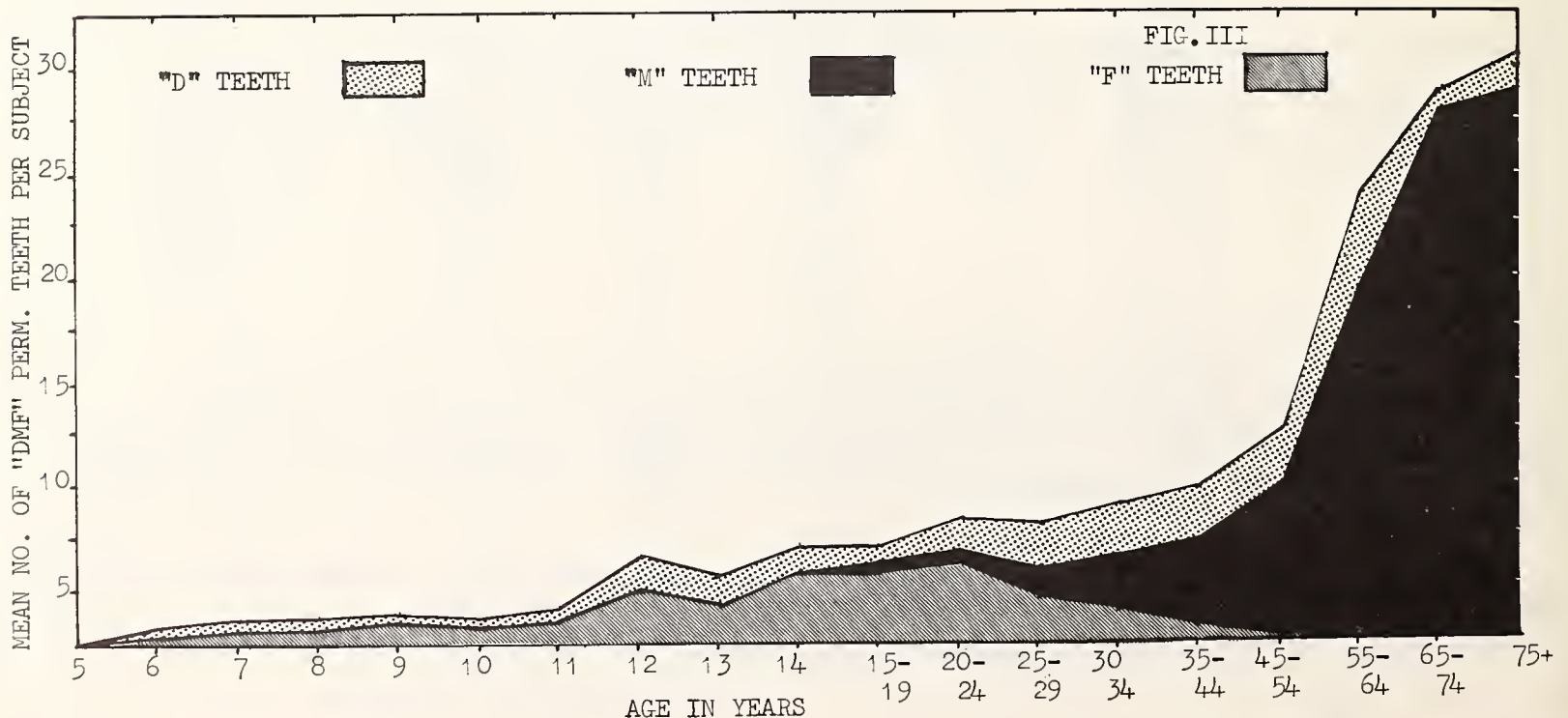


TABLE VIII

Percentage of Decayed Teeth that require (1) Conservative Treatment and (2) Extraction
Data for Permanent Teeth

Age	Total No. of Subjects	Total No. of Permanent Teeth	Total No. of "D" Teeth	"D" Teeth Requiring Conservative Treatment		"D" Teeth Requiring Extraction	
				No.	P.C.	No.	P.C.
5	41	169	5	5	100.0	-	-
6	42	343	23	23	100.0	-	-
7	41	459	26	26	100.0	-	-
8	40	551	23	23	100.0	-	-
9	38	719	18	18	100.0	-	-
10	29	675	20	19	95.00	1	5.00
11	30	801	14	14	100.0	-	-
12	33	799	45	43	95.56	2	4.44
13	42	1,174	46	43	93.48	3	6.52
14	38	1,061	43	43	100.0	-	-
15-19	78	2,320	63	61	96.83	2	3.17
20-24	76	2,400	105	87	82.86	18	17.14
25-29	83	2,574	181	134	74.03	47	25.97
30-34	53	1,684	123	83	67.48	40	32.52
35-44	101	3,193	238	162	68.07	76	31.93
45-54	68	2,168	166	93	56.02	73	43.98
55-64	44	1,407	194	66	34.02	128	65.98
65-74	26	832	25	11	44.00	14	56.00
75 +	11	352	15	6	40.00	9	60.00

Table VIII shows that up to the age of 25 years most of the decayed permanent teeth can be treated conservatively but after this age the proportion of decayed teeth for which extraction is indicated rises. This is confirmed in Table IX.

TABLE IX

Percentage of Total Teeth Present that require Extraction
Data for Permanent Teeth

Age	Total No. of Subjects	Total No. of Permanent Teeth Present	Teeth Requiring Extraction	
			No.	P.C.
5	41	169	-	-
6	42	343	-	-
7	41	459	-	-
8	40	550	-	-
9	38	719	-	-
10	29	675	1	0.15
11	30	799	-	-
12	33	798	2	0.25
13	42	1,172	3	0.26
14	38	1,056	-	-
15-19	78	2,298	2	0.09
20-24	76	2,340	18	0.77
25-29	83	2,471	47	1.90
30-34	53	1,509	40	2.65
35-44	101	2,762	76	2.75
45-54	68	1,681	73	4.34
55-64	44	673	128	19.02
65-74	26	73	14	19.18
75 +	11	59	9	15.25

Table X shows that dental caries is always an important cause for tooth loss accounting for practically all the teeth requiring extraction up to the age of 35 years, after which the proportion falls but even in the older age groups it still accounts for approximately 50% of teeth requiring extraction.

TABLE X
Percentage of Teeth requiring Extraction for which
Extraction is indicated because of (1) Dental Caries
and (2) Periodontal Disease
Data for Permanent Teeth

Age	Total No. of Subjects	Total No. of Teeth Requiring Extraction	Teeth Requiring Extraction Because of			
			Dental Caries		Periodontal Reasons	
			No.	P.C.	No.	P.C.
5-9 incl	202	-	-	-	-	-
10	29	1	1	100.0	-	-
11	30	-	-	-	-	-
12	33	2	2	100.0	-	-
13	42	3	3	100.0	-	-
14	38	-	-	-	-	-
15-19	78	2	2	100.0	-	-
20-24	76	18	18	100.0	-	-
25-29	83	47	45	95.74	2	4.26
30-34	53	40	40	100.0	-	-
35-44	101	76	48	63.16	28	36.84
45-54	68	73	56	76.71	17	23.29
55-64	44	128	91	71.09	37	28.91
65-74	26	14	8	57.14	6	42.86
75 +	11	9	5	55.56	4	44.44

N.B. No extractions were required for orthodontic reasons, i.e. crowding, etc.

Thus there is a need for conservative treatment for adults to prevent the loss of permanent teeth. It is self-evident, of course, that the very nature of the disease, i.e. carious lesions cannot heal themselves, ensures that the caries experience of the child is carried on into adult life. (See Table VII.)

But new carious lesions that do develop in adult life are nearly always of a completely different "type" to those occurring in the younger age groups. In the younger age groups carious lesions mainly attack the crowns of the teeth. In the older adults, as a result of diseases of the tissues supporting the teeth, i.e. chronic periodontal disease, the gums recede and dental caries may then attack the necks of the teeth and so undermine the enamel crowns of the teeth.

When this carious process reaches the pulp tissues, they become infected and die and an abscess forms. The writer has termed this type of carious lesion "senile decay"⁽⁶⁾.

With the exception of diseases of the supporting tissues of the teeth, this type of carious lesion is the major cause for loss of permanent teeth in the older age adult groups. If the health of the supporting tissues of the teeth could be

maintained in adult life then the possibility of this type of carious lesion developing would be dramatically reduced.

The dental caries experience, in both the deciduous and permanent dentitions, is higher than that found in the Tokelau Islands ⁽¹⁾⁽²⁾ but lower than that of the New Zealand Maori ⁽⁷⁾.

The dental caries experience of these three groups of Polynesians can undoubtedly be related to the extent that refined foodstuffs have been introduced into the daily dietary.

From the time of Aristotle, who lived from 384 to 322 B.C., and indeed even before that time, sweet foods have been accused of causing dental caries. Numerous references associating sweet foods with dental caries could be stated. Over more recent years a great deal of scientific information has proved that there is a direct relationship between the frequency of consumption of carbohydrate foods and the incidence of dental caries, i.e. the number of new carious lesions which develop within a given interval of time, ordinarily a period of one year. Refined carbohydrates, especially sugars, are particularly harmful in this respect. Furthermore, the nutritional deficiencies of imported foods may also make teeth more susceptible to dental caries. For instance, tinned meats have, to a great extent, taken the place of local sea food usually rich in fluoride and trace food elements, some of which enhance the resistance of developing teeth to dental caries.

The cause of any disease should be considered under two headings:-

- (a) the remote or pre-disposing causes, and
- (b) the immediate or exciting cause.

Let us consider dental caries under these two headings.

(a) The pre-disposing causes of dental caries still need further investigation. Many theories, some proven, have been advanced. Pre-natal influences, nutrition, heredity, structural imperfections of the teeth, bacterial content of the saliva, emotions, lack of oral hygiene, racial characteristics, chemical reaction of the saliva, chemical content of the hard tissues of the teeth, physical condition of food, chemical constituents of food, variations in the amount of sunshine, lack of fluoride and other trace food elements; all these, and other causes, have been investigated from time to time.

The improbability is that all such factors may pre-dispose to dental caries but no one factor can be isolated as the only pre-disposing cause.

(b) The immediate or exciting cause of dental caries is the scientifically-accepted one that oral bacteria acting on food debris accumulated on the surfaces of the teeth produce acids which decalcify the tooth enamel. Sticky fermentable carbohydrate foods in the debris are the arch-criminals of dental caries.

The trouble is that refined foodstuffs have been introduced with little attempt having been made to impart knowledge concerning their proper proportional use in the dietary. Thus it is that "imported foods" have been cited by many investigators in recent decades as the main cause of the existing prevalence of dental caries amongst people in the Pacific Islands.

2. PERIODONTAL DISEASES

The periodontal tissues are the tissues that support the teeth - namely the gingivae (gums), the periodontal membrane, i.e. the elastic fibres attaching the roots of the teeth to the tooth sockets in the jaw bones, and the bone lining the tooth sockets and surrounding the roots of the teeth.

The term "periodontal disease" includes pathological (disease) conditions ranging from the initial stage of inflammation of the gums to the most advanced stage (of pyorrhoea alveolaris) where the teeth become so loose as to be useless and, if they are not extracted, will ultimately fall out. The initial stage of inflammation, which is an acute condition, gradually subsides as the disease becomes chronic with the formation of periodontal pockets.

(1) Inflammation of the Gingivae

The prevalence of inflammation of the gingivae is rare until the age group 20-24 years as may be seen from Table XI. In the age group 25-29 years the prevalence rises to a maximum of over 20%. It is very much lower in all age groups than in the Tokelau Islands⁽¹⁾⁽²⁾.

TABLE XI

Prevalence of Inflammation of the Gingivae

Age	Total No. of Subjects *	Subjects Exhibiting Inflammation of the Gingivae	
		No.	P.C.
2-11 incl	452	-	-
12	33	2	6.06
13	42	-	-
14	38	-	-
15-19	78	1	1.28
20-24	76	7	9.21
25-29	83	17	20.48
30-34	53	10	18.88
35-44	101	14	13.86
45-54	66	5	7.58
55-64	38	-	-
65-74	12	-	-
75 +	3	-	-

* The total number of subjects does not include those older subjects who are totally edentulous in both jaws.

(2) Periodontal Pockets

Table XII shows that these do not occur in significant numbers until the age group 35-44 years when the prevalence then rises until, in the older age groups, the bulk of the population is affected. However, as pocket formation represents a later stage of chronic periodontal disease (inflammation of the gingivae being the earliest manifestation of the disease) the increase in prevalence tends to occur in later life.

TABLE XII
Prevalence of Periodontal Pockets

Age	Total No. of Subjects *	Subjects with Periodontal Pockets	
		No.	P.C.
2-24 incl.	719	-	-
25-29	83	2	2.41
30-34	53	1	1.89
35-44	101	17	16.83
45-54	66	34	51.52
55-64	38	32	84.21
65-74	12	8	66.66
75 +	3	3	100.0

* The total number of subjects does not include those older subjects who are totally edentulous in both jaws.

Periodontal disease, as Table X shows, is an important cause of tooth loss in subjects 35 years of age and over, accounting for upwards of 40% of teeth requiring extraction in the older age groups. Surveys of periodontal disease in other Pacific Territories and Islands have shown that the disease is most prevalent in adult groups.

Cadell⁽⁸⁾, in commenting on these surveys, has pointed out that each investigator reported that severity, as well as prevalence, of periodontal disease increased with age.

Over-committed as the present operating dental staff are with the effects of dental caries in the younger age groups, and this public dental health problem can in no way be minimised, the effects and importance of periodontal disease in the adult population may not be fully appreciated.

Dental caries is the more dramatic dental disease. Periodontal disease is the more insidious dental disease but, in the older age groups, is of equal magnitude as a public dental health problem as is the dental caries problem.

Periodontal diseases have a variety of aetiological factors, both systemic (pre-disposing factors) and local (exciting factors). The systemic factors may be nutritional, hormonal, allergic, haematological, genetic or just idiopathic. The local factors may be mechanical, bacterial or chemical. There may be a combination of any of these, both systemic and local, with one superimposed upon another, making periodontal diseases, in many cases, very complex problems.

However by far the most common forms of periodontal disease are inflammation of the gingivae and the presence of periodontal pockets (periodontitis). These forms constitute the public dental health problem in which we are interested and are essentially the same pathological problem.

The basic aetiological factor in these forms of inflammatory periodontal disease is irritation of local origin, generally both bacterial and mechanical. Mucinous plaques and materia alba, products of bacterial action in debris stagnating around the teeth, are the primary causes of irritation.

The saliva contains salts in solution and gases, as well as bacteria. When the

saliva comes into the mouth from the salivary glands some gas (carbon dioxide) is given off and then the saliva becomes "a supersaturated solution" and is no longer able to hold all the salts in solution. So some of the salts are precipitated and harden the mucinous plaques on the tooth surfaces to which, by the action of certain bacteria, the mass becomes very firmly adherent.

Therefore, sooner or later, in most mouths, some of the stagnating debris becomes hardened and attached to the teeth by the precipitation of calcium salts from the saliva. These deposits are then called "calculus". The rough surface of this calculus acts as an additional mechanical irritant to the gums, at the same time providing further stagnation areas for debris.

When the teeth are extracted, the stagnation areas between the teeth and gums are thereby eliminated, and so inflammation of the tissues does not persist after the tooth sockets have healed.

Impaction of food between the teeth, such as matured coconut which packs down in between the teeth necessitating the use of "kaniu" sticks to remove it, and the damage caused by the "kaniu" sticks themselves, are added causative factors in localised periodontal disease.

The products of bacterial action around the necks of the teeth and, later, the formation of calculus deposits from the age of early adolescence upwards, are, then, the primary local contributing factors responsible for the initial breakdown of the tissues supporting the teeth, in by far the great majority of affected cases.

If mucinous plaques and materia alba are allowed to persist, and calculus is not removed by regular and thorough scalings, and oral hygiene measures adopted, then the calculus will continue to accumulate. If left untreated, chronic periodontal disease increases dramatically after the age of 30 years. See Table XII.

Later the teeth gradually become loose in the bony sockets remaining around them, pus forms and the gums ulcerate. Most cases of periodontal disease are chronic and progressive. Unfortunately pain is not a cardinal symptom in chronic cases and so treatment is seldom, if ever, sought for the disease.

Each mouthful of food ingested is masticated and triturated in intimate contact with infected and infective material before being swallowed. The impact, in cases of alimentary tract digestive disturbances, of continuously swallowing infected food boli cannot be overstressed.

Further, oral sepsis can cause secondary effects in other organs by local extension into the tissues and blood stream during mastication and by absorption of toxins and bacteria by the vessels of the lymphatic circulation. It is not uncommon to see oral hygiene, which obviously contributes to systemic welfare, being totally ignored in a patient who has severe systemic disease and is receiving adequate medical care and attention. The importance of this focal sepsis in certain heart conditions is grave because of the risk of bacterial endocarditis. So periodontal disease, per se, is a debilitating disease.

To reiterate, calculus, once it has begun to form, accumulates progressively in lieu of any measures to control it by artificial methods of prophylaxis. In view of

this fact it is apparent that such treatment services should be made available systematically, beginning with the older adolescent age groups, in order to remove mucinous plaques and initial deposits of calculus and so improve the health of the gingival tissues and prevent their early breakdown.

When this treatment is carried out for patients with calculus and gingival infection, there is a dramatic improvement in the colour, tone and consistency of the gingival tissues and the patients themselves always comment on the "better feel and taste in the mouth".

This suggests that the incidence of the severe forms of periodontal disease in the adult age groups could be reduced by the implementation of routine prophylactic measures, such treatment, as has been said, commencing with the older adolescent age groups.

Therefore, in the prevention and treatment of periodontal disease, the dental hygienist has a most important role to play.

3. CALCULUS

It is important to understand that calculus "forms" both above (supragingival calculus) and underneath (subgingival calculus) the gum margins.

Usually the calculus deposits are "heavier" above the gum margins on the teeth of the lower jaw and these are the deposits commonly seen on a casual visual inspection. But the calculus that really does the most damage to the supporting tissues of the teeth is the calculus that is adherent to the teeth surfaces under the gum margins, i.e. subgingival calculus.

(1) Supragingival Calculus

There was little evidence in the subjects examined of the presence of supragingival calculus before the age of 15 years, as Table XIII shows. After that age the prevalence of supragingival calculus rises to a maximum of 51.81% in the age group 25-29 years after which it gradually decreases.

(2) Subgingival Calculus

Table XIII also shows that subgingival calculus is prevalent after the age of 20 years and continues to be in all the older age groups.

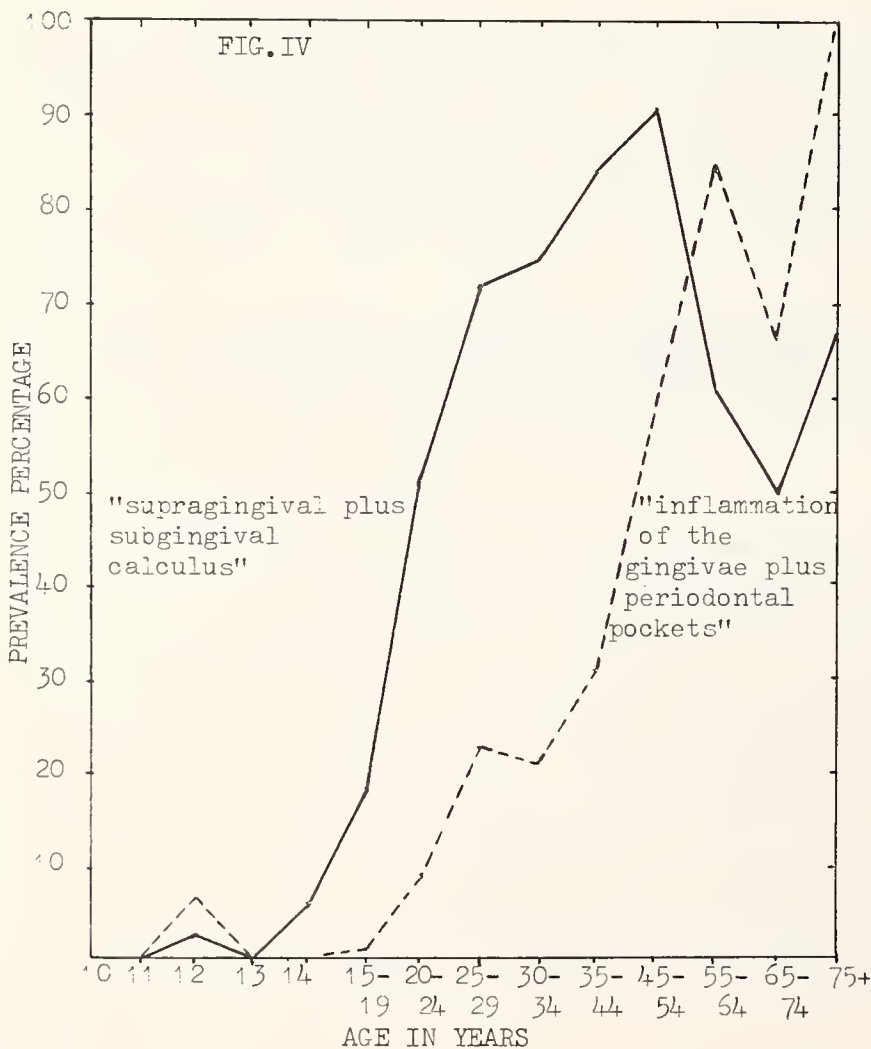
TABLE XIII

Prevalence of Supragingival and Subgingival Calculus

Age	Total No. of Subjects *	Subjects with Supragingival Calculus		Subjects with Subgingival Calculus	
		No.	P.C.	No.	P.C.
2-11 incl	452	-	-	-	-
12	33	1	3.03	-	-
13	42	-	-	-	-
14	38	1	2.63	1	2.63
15-19	78	14	17.95	-	-
20-24	76	29	38.16	9	11.84
25-29	83	43	51.81	18	21.69
30-34	53	22	41.51	18	33.96
35-44	101	32	31.68	54	53.47
45-54	66	11	16.66	49	74.24
55-64	38	4	10.53	19	50.00
65-74	12	1	8.33	5	41.66
75 +	3	-	-	2	66.66

* The total number of subjects does not include those older subjects who are totally edentulous in both jaws

Tables XI and XII have been combined and graphically compared with a combined Table XIII in Figure IV.



The graph presents dramatic visual evidence of the direct relationship between the presence of calculus and its subsequent ill-effect on the health of the gingival tissues. The graph further highlights the suggestion made previously that the incidence of the severe forms of periodontal disease in the adult age groups could be reduced by the implementation of routine prophylactic measures.

It will be noted, particularly evident in the graph, that in the oldest age groups the percentages fall. This is not what one would normally expect to find. The fall is probably due to the relatively small numbers examined in the age groups, together with the fact that, in some of the subjects, the gingivae have receded so much, and become fibrosed, that pockets have been eliminated and calculus dislodged from the teeth remaining in the mouths by "fair wear and tear".

4. HANDICAPPING DENTO-FACIAL ANOMALIES

Table XIV shows that "spacing of the teeth" was the most prevalent anomaly found. No anomalies of a handicapping nature were recorded.

TABLE XIV
Prevalence of Dentofacial Anomalies

Age	*Total No. of Subjects	Subjects with							
		Crowding of the Teeth		Spacing of the Teeth		Deep Overbite		An Openbite	
		No.	P.C.	No.	P.C.	No.	P.C.	No.	P.C.
2	58	-	-	2	3.45	-	-	-	-
3	57	-	-	6	10.53	-	-	-	-
4	66	-	-	12	18.18	-	-	-	-
5	51	-	-	12	23.52	-	-	-	-
6	42	1	2.38	4	9.52	-	-	-	-
7	41	-	-	5	12.20	-	-	-	-
8	40	-	-	7	17.50	-	-	-	-
9	38	-	-	3	7.89	-	-	-	-
10	29	-	-	1	3.45	-	-	1	3.45
11	30	-	-	2	6.67	-	-	-	-
12	33	-	-	2	6.06	1	3.03	-	-
13	42	-	-	5	11.90	-	-	-	-
14	38	-	-	5	13.16	-	-	-	-
15-19	78	-	-	9	11.54	-	-	-	-
20-24	76	1	1.32	3	3.95	-	-	-	-
25-29	83	1	1.20	3	3.61	1	1.20	-	-
30-34	53	-	-	-	-	-	-	-	-
35-44	101	1	0.99	-	-	-	-	-	-
45-54	66	1	1.52	-	-	1	1.52	-	-
55-64	38	-	-	-	-	-	-	-	-
65-74	12	-	-	-	-	-	-	-	-
75 +	3	-	-	-	-	-	-	-	-

* The total number of subjects does not include those older subjects who are totally edentulous in both jaws.

NOTE:- There were no cases of the other dentofacial anomalies - CLEFT LIP, CLEFT PALATE, PROGNATHISM, RETROGNATHISM.

5. DENTAL PROSTHESES

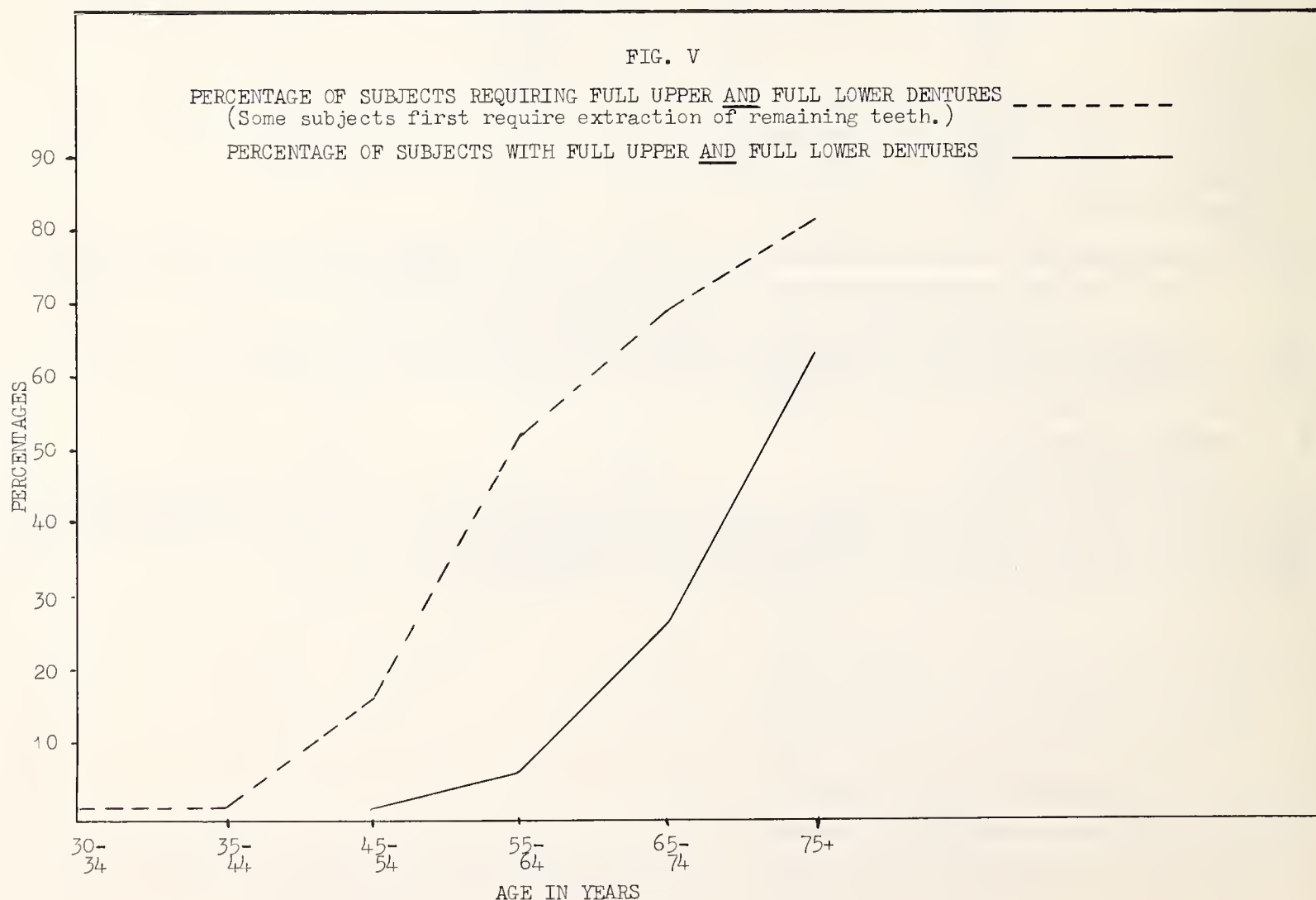
Table XV shows that no subjects under the age of 30 years were either wearing a full denture or required all their remaining teeth extracted. In the older age groups there is a steady rise in the prevalence of edentulous subjects.

TABLE XV

Prevalence of (1) the Fully Edentulous State, (2) all Remaining Teeth indicated for Extraction, and (3) the Wearing of Full Artificial Dentures

Age	Total No. of Subjects	Subject Fully Edentulous in the				Subjects Whose Remaining Teeth are Indicated for Extraction				Subjects Wearing a Full Artificial Denture in the			
		(a)		(b)		(a)		(b)		(a)		(b)	
		UPPER JAW		LOWER JAW		UPPER JAW		LOWER JAW		UPPER JAW		LOWER JAW	
		No.	P.C.	No.	P.C.	No.	P.C.	No.	P.C.	No.	P.C.	No.	P.C.
30-34	53	-	-	-	-	1	1.90	1	1.90	-	-	-	-
35-44	101	-	-	-	-	2	2.00	3	3.00	-	-	-	-
45-54	68	2	2.94	3	4.41	9	13.24	9	13.24	1	1.47	1	1.47
55-64	44	6	13.64	9	20.45	20	45.45	17	38.64	3	6.82	3	6.82
65-74	26	14	53.86	18	69.23	7	26.92	4	15.38	7	26.92	7	26.92
75 +	11	8	72.73	8	72.73	1	9.09	1	9.09	7	63.64	7	63.64

In the sample of 303 subjects examined in the age groups affected, a total of 36 full dentures were being worn and there was a need, after the subjects whose remaining teeth were indicated for extraction had been treated, for an additional 107 full dentures. Figure V. shows, in graph form, the extent of the satisfied demand for full dentures, as well as the remaining need, for the respective age groups. It will be noted that the need appears to be relatively significant.



6. OCCLUSION

Table XVI presents the prevalence of malocclusion in the age group 2-14 years inclusive. Over the whole group of 565 subjects, 71 or 12.57% were diagnosed as having malocclusion. The condition most frequently observed was one where one or more teeth were out of alignment in the dental arch. This deviation from the normal would appear to be mainly associated with eating habits and the use of teeth to husk coconuts and split firewood. People leading a more "natural" life make much use of teeth and jaws. The results as shown in the Table indicate that there is no very serious malocclusion problems amongst the children. No teeth were considered to need extraction for orthodontic reasons. See Table X.

TABLE XVI

Prevalence of Malocclusion in the
Age Group 2 - 14 years, inclusive

Age	Total No. of Subjects	Exhibiting Malocclusion	
		No.	P.C.
2	58	2	3.45
3	57	7	12.28
4	66	13	19.70
5	51	12	23.53
6	42	5	11.91
7	41	9	21.95
8	40	3	7.50
9	38	8	21.05
10	29	2	6.09
11	30	3	10.00
12	33	3	9.09
13	42	2	4.76
14	38	2	5.26

Similar types of malocclusion were observed in the 1953 survey when out of a group of 388 subjects in the age group 2-15 years, 67 or 17.29% were diagnosed as having malocclusion.

It was noted in both surveys that some of the malocclusions occurring in the deciduous and mixed dentition groups tended to correct themselves when the permanent dentition became stabilized.

7. ORAL HYGIENE

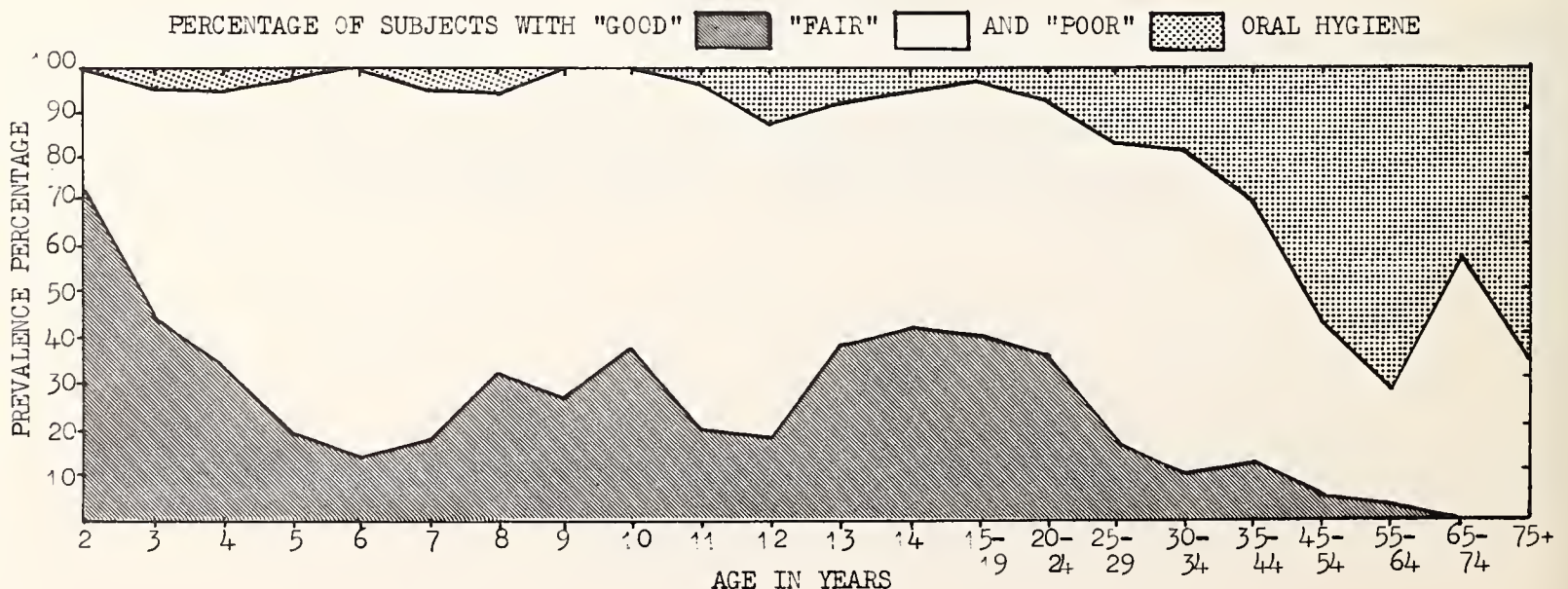
Table XVII shows that relatively few subjects have poor oral hygiene until the age group 25-29 years. In the younger age groups the status of oral hygiene was mostly rated "good" and "fair". The data in the Table is shown graphically in Figure VI.

TABLE XVII
Status of Oral Hygiene

Age	Total No. of Subjects *	Subject With					
		Good Oral Hygiene		Fair Oral Hygiene		Poor Oral Hygiene	
		No.	P.C.	No.	P.C.	No.	P.C.
2	58	43	74.14	15	25.86	-	-
3	57	26	45.61	29	50.88	2	3.51
4	66	23	34.85	40	60.61	3	4.54
5	51	10	19.61	40	78.43	1	1.96
6	42	6	14.29	36	85.71	-	-
7	41	7	17.07	32	78.05	2	4.88
8	40	13	32.50	25	62.50	2	5.00
9	38	10	26.32	28	73.68	-	-
10	29	11	37.93	18	62.07	-	-
11	30	6	20.00	23	76.67	1	3.33
12	33	6	18.18	23	69.70	4	12.12
13	42	16	38.10	23	54.76	3	7.14
14	38	16	42.11	21	55.26	1	2.63
15-19	78	31	39.74	46	58.98	1	1.28
20-24	76	27	35.53	43	56.58	6	7.89
25-29	83	14	16.87	55	66.26	14	16.87
30-34	53	5	9.43	38	71.70	10	18.87
35-44	101	12	11.88	59	58.42	30	29.70
45-54	66	3	4.55	26	39.39	37	56.06
55-64	38	1	2.63	10	26.32	27	71.05
65-74	12	-	-	7	58.33	5	41.67
75 +	3	-	-	1	33.33	2	66.67

* The total number of subjects does not include those older subjects who are totally edentulous in both jaws.

FIG. VI
STATUS OF ORAL HYGIENE



8. TOOTHBRUSHING

The prevalence of toothbrushing is shown in Table XVIII. Of the total patient group, 275 subjects or 25.58% were recorded as never cleaning their teeth; 577 or 53.67% as seldom cleaning their teeth; 204 or 18.98% as cleaning their teeth daily and 19 or 1.77% as cleaning their teeth twice a day.

Figure VII shows in graph form the respective prevalences for each age group.

TABLE XVIII
Prevalence of Toothbrushing

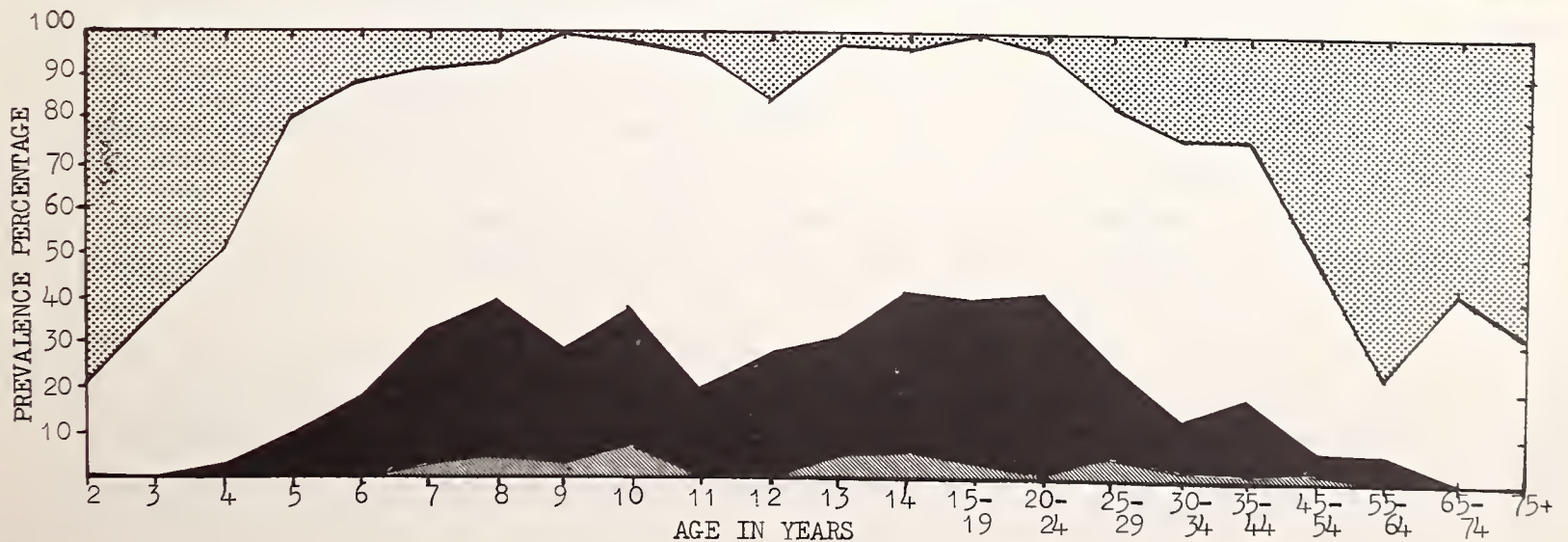
Age	Total No. of Subjects *	SUBJECTS WHO CLEAN THEIR TEETH							
		Never		Seldom		Daily		Twice Daily	
		No.	P.C.	No.	P.C.	No.	P.C.	No.	P.C.
2	58	45	77.59	13	22.41	-	-	-	-
3	57	35	61.40	22	38.60	-	-	-	-
4	66	32	48.49	33	50.00	1	1.51	-	-
5	51	10	19.61	36	70.59	5	9.80	-	-
6	42	5	11.90	30	71.43	7	16.67	-	-
7	41	4	9.76	24	58.54	12	29.26	1	2.44
8	40	3	7.50	21	52.50	14	35.00	2	5.00
9	38	-	-	27	71.05	10	26.32	1	2.63
10	29	1	3.45	17	58.62	9	31.03	2	6.90
11	30	2	6.67	22	73.33	6	20.00	-	-
12	33	5	15.16	19	57.57	9	27.27	-	-
13	42	2	4.76	27	64.28	11	26.20	2	4.76
14	38	2	5.26	20	52.64	14	36.84	2	5.26
15-19	78	-	-	47	60.26	29	37.18	2	2.56
20-24	76	4	5.26	41	53.95	31	40.79	-	-
25-29	83	15	18.07	47	56.63	17	20.48	4	4.82
30-34	53	13	24.53	33	62.26	6	11.32	1	1.89
35-44	101	25	24.75	57	56.44	18	17.82	1	0.99
45-54	66	34	51.52	28	42.42	3	4.54	1	1.52
55-64	38	29	76.32	7	18.42	2	5.26	-	-
65-74	12	7	58.33	5	41.67	-	-	-	-
75 +	3	2	66.67	1	33.33	-	-	-	-

* The total number of subjects does not include those older subjects who are totally edentulous in both jaws.

FIG. VII

PREVALENCE OF TOOTHBRUSHING

PERCENTAGE OF SUBJECTS WHO CLEAN THEIR TEETH "NEVER" "SELDOM" "DAILY" "TWICE DAILY"



The writer was much impressed with the general standard of oral cleanliness and health of the gingival tissues up to the age of 25 years. See Table XI.

The great majority of the mouths of the pre-school children were physiologically clean, that is "naturally" clean. Compare Table XVII with Table XVIII, and the respective graphs in Figure VI and Figure VII for the pre-school age groups.

From observations made in 1940, 1943 and 1953 respectively, the writer is able to state that there has been a gradual improvement in the health of the mouths of the children over the years. It would seem that this has been achieved mainly by the availability of treatment services and by the implementation of simple measures to combat dental ill-health in these age groups, such as rinsing the mouth out with water and toothbrushing.

It was pleasing to observe that dental health education activities continue to be advocated with increasing emphasis and enthusiasm to all the younger age groups by the dental officers and their staff. However much still remains to be achieved, especially in the older age groups, as a comparative study of Tables XVII and XVIII and Figures VI and VII will show.

The most popular method of "artificial" oral hygiene is the use of the toothbrush, combined usually with a dentifrice.

The idea of preventing dental caries by artificial methods of oral hygiene has, in the past, caused some confusion and frustration as, until recent years, it was not known that harmful acids are produced in the mouth within 5-10 minutes after eating. It is obvious, therefore, that for cleaning to be really effective in lowering the incidence of dental caries it should be carried out immediately following a meal. This is the goal the dental officers have in mind and the first step towards this end is toothbrushing in schools under the supervision of class teachers.

At the same time children are encouraged to rinse their mouths out vigorously with water and this is always a practical procedure. Investigators have shown that even rinsing alone is most helpful in controlling the incidence of dental caries as the water, when used vigorously, removes much of the harmful debris and also dilutes the acids that have been formed. As remarked above, beneficial results from this school activity are already evident in the improved general standard of oral cleanliness of the children.

In a comparison of Table XVII with Table XVIII, and the respective graphs in Figure VI with Figure VII, for the young adults and middle age groups, it must not be overlooked that these subjects use the stalks from coconut leaves, called "kaniu" sticks, very extensively as toothpicks. This probably explains why many of them have a satisfactory standard of oral hygiene, yet seldom use a toothbrush. Table XVIII does not take into account the extent "kaniu" sticks are used.

Table XVII and Figure VI show that as age increases there is a rapid deterioration in the standard of oral hygiene.

It is of interest to compare Figure VI with Figure VII. The similarity of the graphs from 6 years of age upwards would appear to be a significant one though not wholly related to toothbrushing alone. The difference in the graphs for the pre-school age groups are due, as has been mentioned above, to the fact that the mouths were physiologically clean.

PART IVCONCLUSIONS

Although dental caries is widespread and diseases of the supporting tissues of the teeth prevalent in the older age groups neither should be looked upon as a "new" disease. Dental diseases have been found everywhere that men are found and they are as old as the human race. The only modern aspect of dental diseases is the high prevalence.

The children, both pre-school and school, are receiving a treatment service and benefiting from a dental health education programme which are effective in preventing the premature loss of both deciduous and permanent teeth. After the age of 20 years it would appear that the main treatment services being provided are extractions of permanent teeth to relieve pain and discomfort and the making of a limited number of artificial full dentures.

Further staff are needed to augment the present conservative treatment services available to the pre-school age groups and also to extend the conservative and periodontal treatment services to the adult age groups, otherwise permanent teeth saved during childhood and young adolescence will be lost later on through neglect, either because of untreated dental caries or advanced periodontal disease.

Even more emphasis should be placed on the teaching of dental health education so that such knowledge may be more widely disseminated with the aim of improving the standard of dental - and general - health of the people. Special dental health education activities should now be directed at the adult age groups.

PART VSTAFF MATTERSA. ESTABLISHMENT

The present approved establishment for dental appointments is:-

- (a) Two dental officers (both with post-graduate training in prosthetic dentistry).
- (b) One dental hygienist/dental mechanic.
- (c) Two dental attendants (chairside assistants).
- (d) Two students at the Fiji School of Medicine, Suva.

For appointment to categories (a) and (b) above, officers require training that can only be undertaken at the Fiji School of Medicine, Suva.

For appointment to category (c) above, officers require training that can be given locally by a dental officer.

NOTE: Clerical services for the dental department are provided by the administrative staff of the Health Department.

B. STAFF SCHEDULE1. TRAINED OPERATING STAFFSTAFF SCHEDULETRAINED OPERATING STAFF

Name and Designation	Appointed		Qualifications	Date of Birth	Length of Continuous Service to 31/8/65
	Temp.	Perm.			
Siona Talagi Dental Officer	13/2/39 - 30/6/45	1/7/45 -	A.D.O. (Apia)	1/10/22	26 years 5½ months
Makauli Poihega Dental Officer	1/11/46 - 31/3/50	1/4/50 -	A.D.O. (Suva)	2/2/34	18 years 10 months
Punatau Olife Dental Hygienist/Mechanic	16/2/61 - 17/3/64	18/3/64 -	Suva Training	11/2/44	4 years 6½ months
Tanoa Lavakula Dental Attendant	31/3/65 -		Local Training	12/6/47	5 months
Vilitoa Togatule Dental Attendant	31/3/65 -		Local Training	11/3/49	5 months

2. STUDENT STAFF

Two students are at present undergoing assistant dental officer training at the Fiji School of Medicine, Suva.

One, Robert Jackson, is expected to qualify at the end of 1966. The other, Sione Simaile Tukutoga, is expected to qualify at the end of 1968.

Reports from the Principal of the School indicate that both these students have the ability to complete the course satisfactorily provided they concentrate on all subjects in the course.

However, should one or the other find the A.D.O. Course beyond their academic standard of achievement, then it is suggested that the Principal be requested to allow the student concerned to undertake the Dental Hygienist Course. Another officer qualified as a dental hygienist would be an invaluable member of the dental health team in the extension of periodontal treatment services to the adult age groups, although, admittedly, such an officer would not be as useful to the community as one with the assistant dental officer qualification.

There is no need for either of these students to undertake training in prosthetic dentistry at this juncture as both the present dental officers have this qualification. The position could be reviewed as and when circumstances indicate.

Provided the services of the present three officers with overseas training can be retained, and the two students graduate with the assistant dental officer qualification, or only one, and the other with the lesser qualification as suggested above, then the appointment of a further student for Suva training need not be considered until 1971 when future staff requirements should be carefully evaluated.

In the interim, however, should a young lady with the required educational qualifications (minimum, School Certificate) and also able to meet selection requirements, apply to undertake the School Dental Nurse Course at one of the three Schools in New Zealand, then the application would be favourably considered by the New Zealand Department of Health.

There would be no charge whatsoever on the Administration for the course, except for travelling expenses to and from the destination in New Zealand, but an undertaking would need to be entered into to the effect that, following the successful completion of the course, the graduate would agree to return to Niue should her services be required by the Administration.

The present staff establishment of two chairside assistants should be adequate for the foreseeable future.

C. EMOLUMENTS

1. DENTAL OFFICERS

It is pleasing to record that the Administration has accepted the principle of parity of pay as between medical and dental officers, with Suva training, as recommended in the 1953 Report. This principle also applies in Fiji. In fact, it has been adopted in many British Commonwealth countries.

Salaries and allowances are reviewed annually in the light of merit, and also post-graduate experience and additional responsibilities, for advancement beyond the initial maximum basic salary step.

It is recommended for favourable consideration that:-

- (a) a dental officer completing the post-graduate course in prosthetics before his initial return to Niue enter the basic salary scale on the third step, and
- (b) a dental officer completing the post graduate course in prosthetics receive a double increment and, if on the initial maximum basic salary, proceed to the next salary step.

2. DENTAL HYGIENIST/DENTAL TECHNICIAN

It is essential that this officer's services be retained if the dental department is to continue to function efficiently. It is recommended that, when he reaches the maximum step of his present basic salary scale, favourable consideration be given to his further advancement in the general salary scale, commensurate with his specialised professional and technical knowledge and ability, in lieu of higher educational qualifications.

3. DENTAL ATTENDANTS

These officers are important members of the dental health team. Their instruction in dental duties is the responsibility of the dental officers. To indicate the type of training required a suggested partial course of lectures accompanies the Report as Appendix I. According to these lectures an enumeration of the functions of a Dental Attendant would include:-

- (i) The making of appointments.
- (ii) Reception of the patient.
- (iii) Preparation of the patient for any treatment he or she may need.
- (iv) Preparation and provision of all necessary facilities - such as napkins, mouthwashes, etc.
- (v) Sterilization, care and preparation of instruments - and in this the attendant should be highly efficient.
- (vi) The preparation and mixing of restorative materials - this to include filling and impression materials.
- (vii) The responsibility, on completion of the treatment, for the care of the patient until the latter leaves the surgery, when the attendant will

- clear away the instruments and prepare them for re-use.
- (viii) The preparation of the surgery for the next patient.
- (ix) The presentation of charts etc. to the dental officer for his completion and the filing of the charts.
- (x) Assistance with X-ray work.
- (xi) Instruction to the patient in the correct use of the toothbrush.
- (xii) Cleaning and oiling handpieces and units.
- (xiii) Housekeeping duties.

The functions outlined above indicate that a dental attendant should be required to be on duty each morning before the dental officer whose hours of duty are 8 a.m. - 12 noon and 1 p.m. - 4.06 p.m.

The basic principle that the dental attendant's function is to assist the dental officer, by providing an extra pair of hands to enable the dental officer to work more effectively and speedily, must be borne in mind.

Because of his relationship with patients and professional staff, it is desirable that he be resourceful, have a pleasant personality and be neat and tidy in appearance. These attributes may be regarded as having an importance equal to that of educational achievement.

Nevertheless the dental attendants should avail themselves of the opportunity extended by the Administration to improve their general educational qualifications.

The duties of a dental attendant have been set out here in some detail as it may not be generally recognized what their work entails. The nature of their duties entitles them to full recognition as specialist officers at adequate rates of remuneration.

Accordingly, it is recommended that the dental attendants, after they have been properly instructed in their duties and completed the normal probationary period for appointees to the service, be transferred to the permanent staff on a salary scale that would adequately reflect their professional responsibilities, and living requirements, as a recognized type of auxiliary dental worker in full-time departmental employment.

If a public dental health service is to be both successful and efficient it must offer a satisfactory career for the staff which it has to attract and retain. Incentives should include adequate remuneration, with a salary scale which allows for increases according to length of service and experience as well as merit. Attention should be given to working conditions and facilities. When staff are required to serve on the mobile dental clinic, it may be necessary to provide for additional benefits which may take the form of increased remuneration or special privileges. Increased responsibilities in a particular field of professional activity should be accompanied by appropriate advances in the salary scale.

D. ADMINISTRATIVE DUTIES OF DENTAL OFFICER IN CHARGE

Medical and dental care is provided by the Administration's Health Department under the direction and control of the Chief Medical Officer. The Chief Medical Officer has delegated authority on dental matters to the Dental Officer in Charge and this is in line with the modern concept regarding the administration and organisation of a public health service.

The Dental Department is, then, under the control of a Dental Officer who is responsible to the Resident Commissioner, through the Chief Medical Officer, for all matters relating to the policy and work of the dental department.

Specifically, the administrative duties and responsibilities of the Dental Officer in Charge may be outlined as follows:-

1. GENERAL MATTERS

- (a) Personnel; allocation of staff, discipline, welfare, salaries and allowances (re salary increments - recommendations to the Chief Medical Officer before the due dates of salary increases, double increments and increments to be withheld, as affecting dental staff under his control).
- (b) Supplies and equipment; ordering and maintenance.
- (c) Clinic building and mobile dental clinic; upkeep, facilities and furnishings.
- (d) Statistics and reports; preparation and presentation to the Chief Medical Officer of (i) monthly returns of work, and (ii), before the third week in April, a comprehensive report on all dental activities for the year ending 31 March.
- (e) Organisation of treatment groups.
- (f) Consultation on educational and public relations activities.
- (g) Responsibility for the economic control of supplies, stores and equipment.

2. DENTAL HEALTH EDUCATION

- (a) Supervision and direction of dental health education and other public relations activities in accordance with the policy of the Department as approved by the Resident Commissioner.
- (b) Instruction and lectures in dental health to officers of the medical and education departments as well as to public groups.
- (c) Preparation of educational material, such as posters, pamphlets, press statements, etc.

In short, the direction and co-ordination of all dental activities of the Health Department, and such other duties as may be required of him, from time to time by the Chief Medical Officer.

E. DENTAL HEALTH EDUCATION ACTIVITIES

Instruction of children and the general public in the principles of oral health and the prevention of dental disease is an important activity of the staff.

World Dental Health Authorities postulate four fundamental principles for public dental health services, namely:-

- (1) Organised dental treatment to maintain dental health, with particular emphasis on the dental care of children. In the present state of our knowledge this aspect of a public dental health service must, of necessity, be given precedence.
- (2) Health education and instruction of the patients, and of the public generally, to encourage sound health practices in relation to diet and oral care, especially in the homes, to reduce the amount and volume of treatment required.
- (3) Research, with a view to the application of control measures to reduce the incidence of the disease.
- (4) The adoption of proven public dental health measures.

Ever since the establishment of the Dental Department the public dental health service has been mainly founded on (1) and (2) above.

This was essential as experience has proved that, to strengthen the preventive character of treatment services, regular organised health education activities should run parallel with clinical operative services.

Specific activities carried out under the dental health education programme include:-

- (a) Publication of items of dental interest in the Weekly Newsletter.
- (b) Individual instruction in oral health; carried out at the chairside.
- (c) Class instruction in toothbrush drill to educate the children in the care of the teeth. At the end of 1964 individual toothbrushes were made available to children at cost price and toothbrushing is now operating in most of the schools. The programme is that children clean their teeth during the mid-morning interval, after drinking the school milk, under the supervision of class teachers, each child having an individual container of water for rinsing. The procedure is carried out in suitable locations in the grounds of the respective schools. After use, the toothbrushes are washed and hung on a class toothbrush board to dry. A letter or figure is allocated each child in a class and thus there is no "mix-up" of toothbrushes. The toothbrushes are kept at the schools. Shortly, the Dental Officer in Charge hopes to be able to make toothpaste, in re-fillable plastic containers, available to the schools at a most reasonable cost.

Since toothbrushing in schools has been instituted there has been a marked improvement in the health of the soft tissues of the mouths of the children concerned and it would appear that there may also have been some beneficial effect on the incidence of dental caries.

The Dental Officer in Charge remarked that a few children now also have tooth-

brushes at home - and this is the ultimate aim that the dental officers have in mind - but it is a long-range one.

It is pertinent at this point to acknowledge the co-operation and assistance extended by the head teachers and their staffs. Their enthusiasm will ensure the success of the project.

The third principle, Research, (3) above, can only be applied in Niue in the field of "applied research", i.e. epidemiological studies. (There are no facilities or staff for the carrying out of "basic research".)

Such studies have been carried out from time to time and much useful information has been obtained by observation. The Dental Officer in Charge carried out such a study a few years ago. The clinical data recorded for the epidemiological section of this Report is another example of "applied research".

When such observations are definite and clear they are just as scientific as observations made using complex scientific equipment; for example, the observation that in some areas in the world a low prevalence of dental caries coincided with the presence of appreciable amounts of fluoride in the potable water supplies; and the observation that a sudden increase in dental caries in a community coincided with a closer contact with "civilized ways of life".

A public dental health programme that does not include research ("applied" in the case of Niue) is dealing only with the results of dental disease and not the causes.

The data obtained from an epidemiological study should be used to evaluate an existing programme and also as a basis to plan how the programme should further expand.

This Report endeavours to fulfil these two requirements.

Action has also been taken under (4) above.

Unfortunately, the lack of water reticulation precludes the adoption of fluoridation of the potable water supply. The next best practicable alternative to fluoridation is the ingestion of fluoride tablets during the time the deciduous and permanent teeth are developing. The need can be stated in very simple terms. Fluoride is a food micro-element, necessary for the development of the teeth, which "sophisticated" diet does not provide in sufficient quantity.

The the Dental Officer in Charge is to be commended for initiating arrangements to have fluoride tablets distributed free to expectant and nursing mothers and to mothers for young children up to the age of 7 years. The scheme was commenced in September 1964.

In planning the scheme he sought, and received, the full co-operation of the Inspector of Police and his staff of Constables stationed in the villages. The Constables issue the required numbers of tablets to the mothers each week and keep written records of all issues. The dental department appreciates the active assistance of these officers of the Police Department in the interests of dental health. Without such help the implementation of this public dental health measure could not have been effected.

While the ingestion of fluoride tablets by pregnant and nursing mothers may, or may not, be of dental benefit (to their children), the psychological value of including the mothers in the scheme (until babies are weaned) far outweighs other

considerations. The practice should certainly be continued. Indeed it should be widely encouraged.

F. STANDARD AND OUTPUT OF WORK

The standard of all types of treatment and work carried out ranged from very good to satisfactory. An examination of the returns of work showed an economic output in relation to quality.

The dental officer in charge is to be highly commended for his initiative in preparing a "desk file" for each individual member of the dental staff. The files have been well prepared and the detailed listings of respective duties and hours of attendance are closely defined. "Productive" time, that is time devoted to clinical duties, is fully accounted for, as is "unproductive" time, that is the time occupied by necessary organisation, records, cleaning duties, etc.

The receipt, by each individual staff member, of a precise written definition of his specific duties and responsibilities greatly increases efficiency. The desk files will change and increase in size and scope as new ideas and techniques develop.

I understand that the State Services Commission Inspector, during a visit to Niue in 1964, also commented very favourably on this aspect of the officer's attention to administrative requirements.

G. HOUSEKEEPING AND APPEARANCE ON DUTY

In spite of crowded conditions the cleanliness in the main clinic building was excellent. Care of instruments and equipment continues to be of a high standard.

The staff were always correctly and neatly attired on duty.

The mobile dental clinic has now been in operation for some nine months. On tour the floor should be thoroughly scrubbed and wax polished every Friday afternoon. Of course, it should be swept out carefully each afternoon after the last patient for the day has left and everything left ready and clean for the next working day.

Every second Friday afternoon the exterior of the mobile clinic should be carefully washed down and thoroughly dried with chamois leather. On the last Friday in the month, after washing and drying, the whole external surface, roof included, should be well polished with a suitable polish. Liquids for use in washing down and polishing are available from the Public Works Department. The external paintwork must never be neglected. If it is, the paint will oxidize and the surface quickly deteriorate and become dull in appearance.

At the completion of each tour of duty, arrangements should be made by the

Dental Officer in Charge for the mobile clinic to be taken to the Public Works Department for complete servicing and, if necessary, the paintwork should also be "touched up".

It should then be taken to the main dental clinic, all cupboards and drawers "spring-cleaned" and stocked-up again with the necessary stores and consumable items required for the next tour.

H. PATIENT EMERGENCIES

For general emergencies reference should be made to the Manual of the St. John Ambulance Association.

1. POISONING FROM SWALLOWING INJURIOUS LIQUIDS

- (1) Give large quantities of water or milk to drink.
- (2) Do not waste time. Get patient to the doctor as speedily as possible.
- (3) Try to be prepared to identify the poison, or produce the bottle from which the poison was taken, for the information of the doctor.
- (4) Do NOT attempt to induce vomiting by putting fingers down the patient's throat if the patient has swallowed ammonia, carbolic acid, kerosene, mineral spirits, petrol or silver nitrate (if silver nitrate swallowed add common salt to the drink of water).

2. BURNS AND SCALDS

- (1) Cover the area with sterile gauze and, if possible, lightly bandage.
- (2) Do NOT apply lotions of any kind and do NOT apply vaseline.
- (3) Refer the patient to the doctor.

3. EYES

- (1) Drugs - wash eyes immediately with copious quantities of water. Refer the patient to the doctor.
- (2) Foreign body - wash out by bathing with copious quantities of water or remove with corner of a clean handkerchief. If the foreign body has been in the mouth, e.g. calculus, amalgam or blood during an operation, seek medical advice for a suitable bacteriostatic agent.
- (3) Injury - cover with pad of gauze or clean handkerchief and refer the patient to the doctor.

4. CUTS AND LACERATIONS

Refer the patient to the doctor.

5. FAINTING AND COLLAPSE

- (1) Loosen tight clothing at the neck and waist.
- (2) If the patient is not completely unconscious, place patient's head between

his knees, exert slight pressure on the back of the patient's neck with the palm of the hand and request patient to try and sit upright.

- (3) If patient unconscious, lower back of dental chair and raise and support legs so that the feet are raised above the level of the head OR lift patient out of the chair and place on the flat of the back on the floor and raise the feet on a cushion. Raising the legs will assist the return of the venous blood to the heart. Make sure airway is patent.
- (4) Have patient inhale aromatic spirits of ammonia.
- (5) With patient conscious, a dose of sal volatile in water may, or may not, be of some slight help.

6. SILVER NITRATE

- (1) Splashes on the skin - swab with normal saline solution and, if necessary, remove stain with diluted sal volatile.
- (2) Splashes on the cabinet, bench or floor - apply iodine and later follow with alcohol.

7. IODINE

- (1) Splashes on the skin - swab with a weakened solution of sal volatile.
- (2) Splashes on the cabinet, bench or floor - remove with alcohol.

8. CARBOLIC ACID

Burns on the oral tissues or lips should be neutralized with glycerine.

9. RESUSCITATION

MOUTH TO NOSE AND MOUTH TO MOUTH RESCUE BREATHING.

- (1) PLACE PATIENT ON HIS BACK IMMEDIATELY.
 - (2) CLEAR THROAT of water, mucus, food, or other obstruction.
 - (3) TILT HEAD BACK as far as possible.
 - (4) PULL CHIN FORWARD to keep patient's tongue out of air passage.
 - (5) BLOW air through nose or mouth (or both) until chest rises. (If blowing through nose close patient's mouth. If through mouth, block nose.)
 - (6) REPEAT 10 to 15 times per minute.
 - (7) LISTEN for snoring and gurgling which are signs of throat obstruction.
 - (8) SEND SOMEONE FOR THE DOCTOR.
 - (9) CONTINUE RESCUE BREATHING UNTIL PATIENT BREATHES FOR HIMSELF.
-

PART VIRECOMMENDATIONS REGARDING THE FUTURE DEVELOPMENT,
ORGANISATION AND REQUIREMENTS OF THE
PUBLIC DENTAL HEALTH SERVICEA. BRIEF HISTORY

For many years prior to 1939 the New Zealand Government and the Niue Administration and Health Department were most concerned regarding the complete lack of any organized dental service on the Island.

The Chief Medical Officer of the day carried out urgent extractions and other emergency dental treatment.

In 1940, the then Resident Commissioner recommended to Government that the Chief Dental Officer, Western Samoa, visit Niue and report on the dental condition, especially of the children, and put forward a scheme for training Niuean boys in dental work.

His recommendations were favourably received and discussions were held with the Administration of Western Samoa. Finally, Government and the Administration of Western Samoa gave full approval and the Chief Dental Officer (the writer) visited Niue with two Samoan Dental Cadets in January 1941.

Thus the first step in the establishment of an organized public dental health service in Niue was taken 25 years ago. Two Niuean boys were selected for training at the School in Western Samoa. They were granted scholarships by the Administration and accompanied the dental team when it returned to Apia.

The next dental visit to Niue was in December 1943, when the writer and the two Niuean Dental Cadets carried out a tour of duty on the Island. Shortly afterwards they qualified as Assistant Dental Officers (Apia) and, following extended field service in Western Samoa to gain experience, they returned to Niue in July 1945 and established the public dental health service.

It is very pleasing to be able to record that they are today valued senior members of the staff of the Department. One of them was chosen in 1954 to go to the Fiji School of Medicine, Suva; he qualified in medicine and is now the Deputy Chief Medical Officer; the other, is the present Dental Officer in Charge.

B. DEVELOPMENT

Since the inception of the public dental health service the organisation has been based on what is today known as "an incremental dental care programme". The adoption of this sound policy ensured the success of the Service.

From 1945 to 1953 routine treatment care was available to the school age groups and emergency treatment services to the pre-school and adult age groups.

From 1954 to 1965 routine treatment care was extended to the pre-school age

groups and the emergency treatment services to the adult age groups were implemented to a limited extent, mainly by the provision of full artificial dentures.

The third and final phase of development of routine services can now be envisaged and planned with the aim to make that excellent expression, "lifetime natural teeth", more than an unfilled gesture of lip service. This will entail the extension of conservative and periodontal treatment services to the adult age groups when the students, at present in training in Suva, qualify and return to take up duty in Niue.

Even at this juncture in a study of the Report the reader may well be turning over in his mind a fair question. "Is the present dental health programme adequate?"

The answer can only be in the affirmative as an adequate dental health programme is one which provides the best clinical, preventive and educational dental service commensurate with the socio-economic level and professional development within the community.

The present programme in Niue certainly conforms to this definition.

C. TREATMENT ORGANISATION

The organisation of the treatment services should continue to be based, as in the past, on the numerical distribution of the school age groups. However, with the mobile dental clinic now in use, the adoption of a revised treatment programme is essential if maximum efficiency is to be achieved and the standard of dental health of the whole population considered in the light of the remarks in the previous paragraph.

The school roll distribution as in August 1965 is set out in the following Table.

TABLE XIX

List of Schools, Villages contributing Pupils, Number attending each School and Classes as in August 1965

Name of School	Name of Village	School Roll	Classes
Tufukia *	Alofi North and South	226	1 - 9
Liolau	Tamakautoga Avatele Vaiea	200	1 - 9
Tuatea	Hakupu	117	1 - 9
Halavai	Liku	99	1 - 9
Lialagi	Lakepa	102	1 - 9
Kofekofe	Mutulau Toi	181	1 - 9
Matalave	Hikutavake Namukulu Tuapa Makefu	272	1 - 9
Halamahaga *	All Villages	192	F.3, 4 & 5
Paliati High * School	All Villages	138	F.1 & 2
Side School	Alofi	35	
TOTAL ROLLS		1,562	

* Tufukia School is to close down and the children are to attend the new school, Halamahaga. Forms 3, 4 & 5 at present at Halamahaga will transfer to the Paliati High School.

Children commence attending school in the year they are six years of age. The approximate age-class distribution for the primary schools is as follows:-

Class :-	1	2	3	4	5
Age (years) :-	5-6	6-7	7-8	8-9	9-10
Class :-	6	7	8	9	
Age (years) :-	10-11	11-12	12-13	13-14	

The present primary school roll is 1,232. Although population projections for a small population as in Niue must be viewed as somewhat unreliable, it has been estimated taking as many factors into consideration as possible, that the primary school population may increase by up to approximately 12% by 1971.

The systematic treatment services, that is the services for school and pre-school children, should be based as closely as possible on a six-monthly recall system. This should be able to be carried out for those children attending the main dental clinic for treatment but there will necessarily be, at least initially, some variation in this time schedule for those attending the mobile dental clinic for treatment.

It is recommended that children attending the following schools receive treatment at the main dental clinic:-

- (i) Tufukia
- (ii) Halamahaga
- (iii) Paliati High School
- (iv) Side School

A dental officer should routinely examine the children at the respective schools so that only those children needing treatment would be required to attend the main dental clinic. It is anticipated that suitable transport facilities could be made available, if considered necessary, by the provision of bicycles for the older children and the use of a Land Rover to transport those in the primer classes.

It is recommended that children attending the "outer" schools receive treatment in the mobile dental clinic. When the mobile dental clinic is on tour, pre-school children, and adults requiring "simple" dental treatment, residing in the respective villages, should also be treated.

It is very pleasing to record that approximately 50% of the pre-school children in the 2½ - 5 year age group are enrolled for treatment. The numbers attending from each village are:-

Tamakautoga	50
Avatele	61
Vaiea	19
Hakupu	20
Liku	13
Lakepa	18
Mutulau	39
Toi	7
Hikutavake	13
Namukulu	10
Tuapa	47
Makefu	23
Alofi North & South	64
Total	<u>384</u>

The recommended detailed itinerary for a complete tour of the mobile dental clinic is as follows:-

Ref.No. for each Location of Mobile Dental Clinic	Name of Village or School	Approx. Length of Stay in Each School District
1	Tamakautoga	{ 6 weeks
2	Avatele	
3	Liolau	
4	Vaiea	
5	Tuatea	{ 4 weeks
6	Hakupu	
7	Halavai	{ 3 weeks
8	Liku	
9	Lialagi	{ 4 weeks
10	Lakepa	
11	Kofekofe	{ 6 weeks
12	Mutulau	
13	Toi	{ 8 weeks
14	Hikutavake	
15	Namukulu	
16	Matalave	
17	Tuapa	
18	Makefu	
19 & 20*	Alofi North & South	1 week

* 19 & 20 Alofi North & South

NOTE: These locations are only for the treatment of pre-school children.

The itinerary, of course, will be subject to variation from time to time but every endeavour should be made to follow it as closely as possible though this will be difficult with the present staffing position. As detailed, one complete tour will occupy approximately eight months - not the six-monthly ideal.

The mobile dental clinic, which is equipped for two operating officers, should be permanently staffed by a dental officer and a dental attendant. Until the dental officer staff is strengthened, the dental hygienist/dental mechanic should also be on duty with the mobile as circumstances indicate and as decided by the dental officer in charge.

This staffing of the mobile will also allow one dental officer and one dental attendant to be permanently on duty at the main dental clinic.

Adult patients requiring more extensive treatment, full dentures, etc., will be required to attend the main dental clinic.

When the dental officer staff is increased then two dental officers should be on duty with the mobile dental clinic, plus a dental attendant, when it should be possible to complete one tour in a period approximating six months.

D. FEES

The question of whether or not a scale of fees for conservative, periodontal and surgical dental treatment services should be recommended for the adult age groups has been given much thought. Taking into account the treatment needs of the groups as disclosed by the survey the conclusion has been reached that the policy regarding the availability of allied medical treatment services should apply.

In arriving at this decision the writer was guided by a consideration which is irrefutable and that is that dentistry is an essential part of a total health service and so dental care should not be viewed in the light of an optimal benefit but must be included as an integral part of an ever increasing standard of life and welfare. Every individual has an innate right to be considered as a total human being. Further, thought on the availability of clinical services should not be divorced from consideration of the humanities.

Accordingly it is recommended that the dental treatment services, referred to above, be provided free of cost to all members of the community.

Nevertheless, because the very basis of a public health service is prevention, it is also recommended that the present policy of charging fees for replacement treatment services, i.e. full denture prostheses (and for gold work as well) be reaffirmed.

Details of the landed cost of the various materials required for the construction of full artificial dentures have been obtained and on the basis of this accounting it is considered that some fee concession could reasonably be allowed.

Therefore, in view of the need shown by the survey and the fact that those requiring full dentures are mostly in the older age groups and are past the years of their real earning capacity, it is further recommended that the fee for a full set of artificial dentures be reduced from £10.0.0 to £8.0.0; and the fee for one full artificial denture from £5.0.0 to £4.0.0.

No variation in the present fees for gold work is recommended.

E. PHYSICAL FACILITIES

MAIN DENTAL CLINIC BUILDING

This building was erected in 1946 in the hospital grounds to a plan submitted by the writer. It is well constructed and withstood the hurricanes in 1959 and 1960 when so many other buildings were either wholly demolished or severely damaged by the storms.

It consists of a surgery 18' x 18', a waiting room 9' x 8' and an office cum storeroom 9' x 8'. The surgery is a well-ventilated, netted room. Natural lighting is good but on dull, overcast and wet days the use of artificial lighting for operative work is required.

The clinic proved very satisfactory for the physical requirements of staff in carrying out the scope of treatment undertaken for many years but, now, with the gradual extension of treatment services and increase in staff establishment, it is completely inadequate.

The question of the need for permanent clinic buildings in some of the outer schools and villages has been very fully considered but the commendable action of the Administration in acquiring the mobile dental clinic has obviated what would otherwise have been an urgent, necessary and costly dental clinic building programme. Therefore the erection of permanent dental clinic buildings in "outer" centres is not recommended.

However, an extension to the present main dental clinic building is urgently required. This matter was carefully considered and a draft plan of minimum requirements with the necessary fittings was prepared during the visit and handed over to those concerned for favourable consideration.

The proposed extension allows for necessary additional accommodation as follows:-

- (i) Prosthetic laboratory (workroom) with a re-inforced concrete cupboard in one corner (the cupboard to open on an external wall) to house the acetylene and other gas cylinders, spare cylinders not in use and bulk supplies of methylated spirits and absolute alcohol. At present prosthetic work is carried out in the surgery and this violates aseptic principles and creates conditions unfavourable to the health of patients undergoing treatment, especially of a surgical nature. The gas cylinders in use are completely exposed and are kept in a corner of the surgery. Spare cylinders are stored in the small waiting room. In the event of a mishap, such as an explosion, lives would be seriously endangered.
- (ii) Small room for the manufacture of toothpaste which must be carried out under hospital standards of cleanliness, completely free from dust and other contamination. This room would also serve as a storeroom for the basic materials required and for storing the manufactured toothpaste.
- (iii) Storeroom for keeping bulk consumable supplies, spare instruments and equipment and stationery items. All these items should be kept "under lock and key". At present these items are, perforce, "stored" in the office, under benches in the surgery and in the waiting room and are, in effect, open "to all and sundry". This state of affairs throws undue responsibility in this regard on the dental officer in charge.

The space in the present office is required for the keeping of current records, textbooks and issues of dental literature.

- (iv) Lavatory.

The additions will also allow for a place in which the staff can hang their operating gowns and change from their "street" clothes. At present there are no such facilities.

It is only because a high standard of housekeeping is maintained at all times in the clinic building that the present unsuitable and crowded conditions do not appear, at first sight, to be having detrimental effects either on working efficiency or on

the standard of the treatment services.

Therefore, there are strong and logical reasons for suggesting that the additions to the present clinic building be commenced in the immediate future and, accordingly, this is recommended. It is thought that the cost of the additions and necessary fittings could approximate the amount of £1,500. However, until the specifications set out in the draft plan are costed in detail, it is not possible to state the capital cost of the recommended alterations accurately, though the final amount could well be below the figure given above.

In adding to the present building the finished dental clinic should be brought up to the current standard and finish as for a new building.

Interior finishes should be to hospital standard and maintained as such. Walls should be in high gloss finish. Provision should be made in the ceilings for air ventilation (peg board) and undersides of rafters and ties lined for coolness. Ceilings should be finished in white high gloss so as not to reflect heat. In the additions cross ventilation must be arranged.

Hot as well as cold water services are required. It is recommended that a ten gallon pressure type approved hot water cylinder be installed to supply the outlet points controlled by standard taps.

F. FIRE PRECAUTIONS

The writer wrote to the Chief Fire Officer, Fire Brigade Headquarters, Wellington, and set out in detail the present physical facilities, and additions recommended to the main dental clinic building, and also enumerated the flammable liquids and gases in use. He concluded his letter by requesting the Chief Fire Officer's advice regarding the type of fire extinguisher best suited in the circumstances and under the climatic conditions experienced in Niue. Subsequently he discussed the matter further with the Chief Fire Officer who, in a letter dated 9 November 1965, advised as follows:-

"Fire Protection - Dental Premises - Niue Island"

Further to your letter of 5th November and our subsequent discussion on the above matter I append below my recommendations.

(1) Permanent Clinic Building

- (a) All electrical work in the proposed new extension to this building should have the conductors enclosed in screwed conduit and, if not already the case, existing conductors should also be protected in this manner.
- (b) The proposed re-inforced concrete cupboard should be provided with wall brackets to hold the acetylene and oxygen cylinders firmly in position as any free movement is likely to lead to leaks in the distribution piping. The cylinders should be provided with main turn-off keys kept in the cupboard and this should be the means of shutting off the supply of gas at the end of each day.

The tap or valve from each cylinder in the interior of the building should be protected against accidental opening.

- (c) Bulk supplies of methylated spirits and absolute alcohol should be stored in a substantial rack/shelf in the concrete cupboard and only a one day's supply of each substance should be in the clinic at any time.
- (d) It is recommended that 4 lb. and 15 lb. carbon-dioxide fire extinguishers be provided for this building. The 4 lb. extinguisher should be located in the surgery where it can be under supervision and placed on a wall bracket adjoining the main exit from the surgery, the base to be no lower than 3'6" nor higher than 5' from the floor level.

The 15 lb. extinguisher should be allocated for the workroom and placed in a suitable position on the floor readily available for immediate use.

(2) Mobile Dental Clinic

- (a) A 4 lb. carbon-dioxide fire extinguisher should be provided for this appliance and securely located on a wall bracket as for the dental surgery.
- (b) Containers of flammable liquids to be securely stoppered and handled with care at all times.

(3) General

In order to reduce the risk of an outbreak and possible spread of fire all personnel should practise a high standard of "house-keeping" in all phases and locations of operation. Combustible waste of all kinds should be removed from the building daily and disposed of at a safe distance.

Carbon-dioxide extinguishers should be weighed every six months and the weight compared with the weight of the fully charged extinguisher which will be found stamped on the body. Any extinguisher showing a loss of more than 10 per cent in the weight of the contents should be sent for recharging."

Inquiry in the Trade elicited the information that the type of carbon-dioxide fire extinguisher recommended by the Chief Fire Officer was the "Carbonic" CO₂ Fire Extinguisher manufactured by Messrs Carbonic Ice Ltd., Christchurch. Their Auckland address is Hamer Street, where they have a recharging depot.

The cost of the 4 lb. extinguisher is £11.5.6. It is supplied complete with wall brackets and screws. It is trigger operated, stands 19" high and has a total weight of 13 lbs.

The cost of the 15lb. extinguisher is £24.12.6. It is supplied mounted on wheels. It is also trigger operated, stands 36" high and weighs 49 lbs.

The CO₂ does not deteriorate.

It is recommended that two 4lb. and one 15lb. extinguishers be purchased.

G. STORES AND EQUIPMENT

1. STANDARD LISTS

It was evident that all reasonable requests for items of stores and equipment have been approved. This has ensured the continued availability of existing treatment services.

A complete stocktaking of consumable items, instruments and equipment was carried out during the visit and everything was found to be in order, stock card entries agreeing with stock on hand.

Opportunity was taken to write off some items of non-consumable stores due to "fair wear and tear". These items had been in use for upwards of 20 years.

To facilitate future ordering and stocktaking procedures Standard Lists of Consumable and Non-consumable Stores have been prepared and accompany the Report as Appendix II, "Standard Lists of Stores and Equipment".

The Lists are:-

Standard Lists
of
Consumable and Non-consumable
Stores
for

1. Dental Officer with Prosthetics Training
2. Dental Officer
3. Dental Hygienist
4. Dental Technician.
 - (1) Section A - Drugs and Expendable Materials
(consumable items)
 - (2) Section B - Equipment and Non-expendable Materials
(non-consumable items)

N.B.: The numbers, 1, 2, 3 and 4 as referenced above, in Column (1) in the lists, before items listed in Column (2) in the lists, indicate to what category of officer the item should be made available.

In other words, the lists cover basic items for all types of officers.

It should be appreciated, however, that these lists will require additions, deletions and/or amendments from time to time.

Detailed specifications for each individual item listed will also have to be prepared by the dental officer in charge so that requisitions can be properly prepared when placing orders in New Zealand and Overseas.

It is essential that the latest leading Dental Trade Catalogues be available for the preparation of specifications and for ordering purposes.

They comprise:-

1. Amalgamated Dental Trade Distributors (London) List Catalogues -
 - (i) List "D", Forceps, Elevators, Lancets and Scissors, 1961.
 - (ii) List "E", Handpieces and Engine Instruments, 1964
 - (iii) List "G", Ash Hand Instruments, 1963.
 - (iv) List "H & K", Operating Room Sundries, 1961
 - (v) List "J", Impression Trays and Materials, 1964.
 - (vi) List "L & M", Laboratory Appliances, 1963.
2. S.S. White Dental Manufacturing Company, (Philadelphia, U.S.A.), General Catalog of Dental Supplies, 1964-5 Edition.

3. Star Manufacturing Co. Inc., (Philadelphia, U.S.A.), Catalog of Star Dental, Latest Catalog but undated.

(A Standard List of Stationery Items has not been prepared as this can be complied more correctly by the Dental Officer in Charge).

2. ORDERING OF EQUIPMENT AND STORES

(1) Equipment

The supply of equipment must parallel staffing increases. The adoption of Standard Lists of Equipment and Non-expendable Materials, Section B of the Lists, render this action a simple matter of indenting, say twelve months in advance, for the capital items required.

Moreover, if the recommendations contained in the Report regarding such items are adopted, then future requirements for some years to come, even allowing for staff increases, should be minimal.

(2) Stores

At least an eighteen (18) months' supply should be held in stock and indent orders placed every six (6) months to ensure that this stock level is maintained.

There is one new item that has been recommended in the Standard Lists, Section A - Drugs and Expendable Materials, and that is "Disposable Sterile Hypodermic Needles".

The risk of transmission of viruses, as well as pathogenic organisms, by contaminated hypodermic syringes has been emphasised in recent years⁽⁹⁾. Difficulties inherent in the killing of viruses and some resistant strains of organisms have led to improvements in equipment and the laying down of more rigid rules governing techniques of sterilization.

Disposable hypodermic needles have recently become available to the dental profession (1963).

It would seem that the dental profession may be falling behind in the appreciation of the need for greater care in their methods of sterilization. The desirability of disposing of used hypodermic needles and local anaesthetic cartridges is emphasised if the risk of transmitting homologous serum jaundice is to be eliminated.

Therefore the use of disposable sterile hypodermic needles has been universally recommended.

When using these needles dental officers should follow these instructions and notes implicitly:

1. The sterile needle is contained in a plastic container. One end of the container is white and this is called the "needle cap". The other end of the container is red and this is called the "needle sheath".
2. The white plastic end (needle cap) is joined to the red plastic end

(needle sheath) by a "heat seal". This simply means that the white plastic end has been joined to the red plastic end by heat and the imprint of where the heat has been applied is easily discernible.

3. Do not use the needle if the seal has been broken.
4. The actual needle must never be touched by the operator or by a foreign body.
5. Now take the Astra syringe and remove metal nozzle (syringe nozzle is not required when using a disposable sterile needle).
6. Sterilize syringe, i.e. barrel and plunger, by boiling in the usual way.
7. Pick up needle container and twist needle cap (white plastic end) to break heat seal. Remove needle cap and put cap aside.
8. The hub of the sterile disposable needle is self-threading and will "screw-on-to" the Astra syringe.
9. Now "attach" needle to syringe by using the needle sheath (red plastic end) as a wrench to screw the needle hub on to the syringe i.e., screw the self-threading hub on to the threaded syringe end.
- N.B. Make sure the needle is screwed on in line with the long axis of the barrel of the syringe, i.e. "straight on" and not on an angle.
10. Do not remove needle sheath until you are actually ready to carry out the injection.
11. Insert local anaesthetic cartridge into syringe barrel after sterilizing rubber puncture cap of cartridge. Close syringe plunger in place.
12. When ready to carry out the injection remove needle sheath by twisting it and at the same time exerting a slight pull. Be careful not to bend the needle. Put sheath aside.
13. After completing the injection remove needle from syringe by replacing the needle sheath and unscrewing the needle. (The needle sheath serves as a wrench both when screwing the needle onto the syringe and when removing it from the syringe).
14. Replace needle cap and discard container and needle. The needle cannot be safely sterilized. Therefore needles must only be used once and then discarded.

(3) Future Requisitions

It is recommended that requisitions received by the Stores Officer, in the Auckland office of the Department of Island Territories, be referred immediately to the office of the Director, Division of Dental Health, P.O. Box 2941, Wellington, for advice and comment, and then be returned to the Stores Officer for him to action in the usual way.

For instance, some items requested may be able to be supplied by the New Zealand Health Department's Store at considerable financial advantage to the Niue Administration and this could be indicated to the Auckland Stores Officer before he takes final action.

The Chairman, Government Stores Board, has indicated his approval of this recommendation.

(4) Items required at the present time

Purchase of the following items has already been recommended in a written communication addressed to the Chief Medical Officer in reply to an inquiry received from him dated 13 October, 1965, reference, Health Department Niue, No. 1/2.

Item	No. req'd	Approx. Cost	Source of Supply
J.M. Sion Dental Pump Chair, No.2, Ivory Tan Colour	1	135. 0. 0	Shalfoon Bros., P.O. Box 1673 Auckland
Fret Saw	1	13. 6	ditto
Fret Saw Blades	1 gross	1. 7. 6	ditto
Ash Foot Engine complete with cable arm	1	30. 0. 0	Health Department Wellington
Ash Foot Engine Cable Arm (spare)	2	12. 0. 0	ditto
Sterilizer, electric, dental	1	34. 0. 0	ditto
Head-rest Cover, plastic	12	1. 0. 0	ditto
Planet Operating light	2	80. 0. 0	ditto
"A" type Electric Dental Unit (reconditioned)	1	20. 0. 0	ditto
Air-compressor for "A" type electric dental unit (reconditioned)	1		
Rubber Operating Mats, small	6	4.16. 0	ditto
Total Approx. Cost	-	£318.17. 0	-

(5) Further items required in the future

- (a) It is recommended that a second pump chair be purchased in the 1967-68 financial year. The "screw-up" metal chair at present in use has outlived its usefulness and should be written off.

The pump chair recommended is again the J. Morita Dental Manufacturing Co.Ltd. one, the J.M. Sion Dental Pump Chair, No.2, in Ivory Tan Colour, the approximate price being say £140. As stated above the New Zealand agents are Messrs Shalfoon Bros., Auckland.

- (b) It is also recommended that a sum, say of £300, be allowed for in the estimates for the financial year 1968-69 for purchase of a High Speed Unit with Air Compressor. The market availability and design of such units will no doubt both be much improved by that time, so it would be advisable to defer specific recommendation regarding the "make" to be purchased.

(6) Self-adhering Labels for Medicament Bottles.

Messrs Avery Labels (N.Z.) Ltd., Auckland, make these labels, Trade Name "Permafix". The labels are obtainable from the Health Department Store.

(7) Metric System

In view of the introduction of the metric system in Pharmaceutical, Medical and Dental Practice it is considered that dental staff should be knowledgeable in the system. New ranges of bottles to conform with recommended metric sizes are now coming into dental use. Staff should be able to amend columns (3) and (4) where necessary in the Standard Lists of Consumable Items (Section A) in due course for ordering purposes, when the metric system becomes more universally adopted in the dispensing of dental drugs and dosage volumes.

To assist in this understanding use should be made of the two conversion tables recently published by the Department of Health, New Zealand.

H. STATIONERY

RECORD SYSTEM AND RETURN FORMS

The records system is simple and adequate. Entries in all the records had been made carefully and neatly. The examination chart in use is adequate.

However, in view of the development and organisation now recommended in the Report it is considered that amended "daily record of treatment" and "monthly return" forms should be adopted.

Revised forms have been prepared and are included as Tables XX to XXIII inclusive.

- | | |
|-------------|---|
| Table XX | - "Daily Record of Treatment for Children" (both school and pre-school) |
| Table XXI | - "Daily Record of Treatment for Adults" |
| Table XXII | - "Monthly Return for School and Pre-School Children" |
| Table XXIII | - "Monthly Return for Adults" |

TABLE XX

DAILY RECORD OF TREATMENT FOR CHILDREN - NIUE ISLAND DENTAL SERVICE Page .

MONTH: 19 DENTAL OFFICER: DENTAL ATTENDANT:

[illegible]

TABLE XXI

DAILY RECORD OF TREATMENT FOR ADULTS - NIUE ISLAND DENTAL SERVICE

Page _____.

MONTH: 19

DENTAL OFFICER: _____

DENTAL ATTENDANT: _____

		PERIODONTIA		FILLINGS		EXTRACTIONS		PROSTHETICS	
Date, Village	Sex Exam.	X- Ray	Scale, Clean etc.	Amalgam	Cement			A = Impressions	Misc.
and			& Pol-		or	Caries Perio-		B = Centric	OP'S.
Patient's Name			ish	A = Simple	Sili-	dental		C = Try-In	AgNO ₃ Total Com-
				B = Compd.	cate			D = Completion	Surg ² OP'S. ple-
								E = Ease	ery, tions etc.
								F = Repair	Inlay,
								G = Reline	etc.
								FULL	PART.
Carried Forward:									

TABLE XXIII
NIUE ISLAND DENTAL SERVICE
RETURN FOR MONTH OF 19
ADULTS

No. Exam.	X- Ray	<u>PERIODONTIA</u>		Total Fill- ings	<u>EXTRACTIONS</u>		Total	<u>PROSTHETICS</u>			Dental Health Education Activities	No. of Patients Treated During Month
		Scale	Clean etc. and Polish		Caries	Perio- dental		A= Impressions	Misc.	Total		
								B= Centric	OP'S.	OP'S.		
								C= Try-In				
								D= Completion				
								E= Ease				
								F= Repair				
								G= Reline				
								<u>FULL</u>	<u>PARTIAL</u>			
								A	A			
								B	B			
								C	C			
								D	D			
								E	E			
								F	F			
								G	G			

REMARKS:COMMENTS ON REPORT:

Dental Officer-in-Charge

Chief Medical Officer

Individual officers should maintain their own daily records of treatment and submit their monthly returns to the dental officer in charge with their daily records of treatments attached to their respective monthly returns. The dental officer in charge will prepare combined returns for all officers for both "School and Pre-school Children" and "Adults" in quintuplicate and forward them to the Chief Medical Officer for his attention. The Chief Medical Officer will then retain one copy of each for the hospital file and return one copy of each to the dental officer in charge. The remaining copies are to be forwarded to the Resident Commissioner, one copy of each to be retained by him, the other two copies of each monthly return to be forwarded to the Secretary, Department of Island Territories, who will forward one copy of each to the Director, Division of Dental Health.

The dental officer in charge will file all individual returns and the copies of the combined returns sent back to him by the Chief Medical Officer on the respective clinic files. Should it be necessary to check the returns of work of a particular officer at any time his personal returns will be on file in the clinic.

When preparing the returns of work for the annual report the figures in the respective combined monthly reports can be added together and appear in the annual report in the same form as the monthly returns of work.

I. RADIOGRAPHIC RADIATION

As a Watson-Victor Dental X-ray Unit has recently been made available to the Dental Department it is relevant to include advice on radiation protection. Accordingly the writer addressed an inquiry to the Director, National Radiation Laboratory, P.O. Box 1456, Christchurch, N.Z.

In a letter in reply, dated 10 November, 1965, his reference 6/A (this reference should be quoted in subsequent correspondence to the Director from the Health Department, Niue), he advised as follows:-

"DENTAL X-RAYS

The ways in which the radiation dose to the dental patient may be minimized are as follows:-

1. The use of the fastest available film.
2. The use of correct developing techniques.
3. The use of sufficient filtration of the primary x-ray beam. (Generally at least 1 mm aluminium).
4. The use of the minimum field size to cover the film.

The safety of any x-ray machine depends, of course, also on the way in which it is used. The following simple safety rules have been found to be effective in minimizing the radiation doses received by the dentist and his assistants. Provided they are observed, no person should receive significantly high doses of radiation in dental practice.

Whenever an x-ray exposure is made the dentist should:

1. Stand well clear of the primary x-ray beam (observing its direction and remembering that the beam diverges from the x-ray tube.)
2. Stand as far as possible (at least 4 to 6 feet) from both the tube and the patient.
3. Never hold the film in position during radiography and never instruct a dental attendant to do so. On the rare occasions when such holding is necessary a parent or friend of the patient should be asked to do it.
4. Take care not to expose other people in the vicinity to stray radiation.

There should be no difficulty in keeping the scattered radiation doses to the Niue staff satisfactorily low if they observe these rules. In the large surgery there, full use should be made of the space in standing well back during x-ray exposures.

Developing of films should be done in the dark or under a suitable safe-light. As the temperature of the developer is important it is preferable to have this controlled, but as dental x-rays are not taken routinely at Niue you may not think this is justified. However, the temperature of the developer should be noted and a temperature/developing-time graph consulted for the appropriate developing time. Simple graphs or charts of this nature are usually readily available from the manufacturers of dental films. The important thing to do, and it may seem trite to add this, is to follow the manufacturer's instructions closely. Unfortunately, some dentists consistently under-develop their films, which means that they have to give more radiation to blacken the film sufficiently. The correct method is to settle on the correct developing technique and then to adjust the exposure time to suit. It is also important that the developer be reasonably fresh, longer developing times being necessary with old or much-used developer.

We will be pleased to extend our radiation monitoring film service to dental staff on Niue. At present we are sending monitoring films to the Chief Medical Officer, Lord Liverpool Hospital, every month, and perhaps the films for the dental staff could be included. Probably we would send them three times

a year (as is usual in dental practices in New Zealand) but would be pleased to send them monthly if required. Will you please let us know if this would be a suitable arrangement?

We have no plans for Radiation Officers from this laboratory to visit and check the Niue dental x-ray machine. The last visiting of Pacific Islands was in 1957 and it is probable that other visits will be made some time in the future, but, as I said, no plans have been made to do this. However, most of the safety checks on the dental x-ray machine could very easily be made by the dental staff themselves without special equipment and without subjecting themselves to any hazard. We would supply instructions, special films to measure doses, and an aluminium filter (and perhaps a lead diaphragm if it is found necessary to reduce the field size).

If you would like this 'postal' check carried out please let us know who to contact on Niue. "

The writer, in acknowledging receipt of the letter, thanked the Director for his informative detailed reply. He also told him he could expect to hear directly from the Chief Medical Officer regarding the suggestions he had so kindly made in the last two main paragraphs of his letter.

The advice from the Director should be read in conjunction with an article entitled "Nine Years of Radiation Protection in New Zealand Dental Radiography" by B.D.P. Williamson, B.Sc., Physicist, Dominion X-Ray and Radium Laboratory, Department of Health, Christchurch, N.Z., published in the January, 1963, issue of the New Zealand Dental Journal.

J. DENTAL MODELS AND LITERATURE

Models are required for constant visual instruction and recognition of the various anatomical features and their relative relationships, one to another, in the oral region; the literature, for learning purposes, to keep the staff up-to-date regarding dental diseases and modern forms of treatment and medication. The necessity and importance of having readily available up-to-date authoritative references in any dental department or institution cannot be over-emphasized, but nowhere could it be more essential than in Niue because of its complete geographical isolation.

The textbooks on hand are to a large extent out of date. Periodicals were received until 1960 when the annual subscriptions were apparently allowed to lapse.

It is recommended that the items listed below be purchased, and, in regard to the periodicals, the annual subscriptions renewed from year to year.

(1) Recommended Anatomic Models for Teaching and Demonstration Purposes

NOTE: These models are obtainable through Messrs N.M. Peryer Limited, P.O. Box 833, Christchurch, N.Z., Sole Distributors in New Zealand for Deutsches Hygiene-Museum, Dresden.

*Catalogue Number	ITEM	Approx. Cost in N.Z.
E 281	Maxilla and mandible of adults, natural size, on stand, made of unbreakable plastics	12. 5. 0
E 282	Fully developed milk teeth, natural size, on stand, made of unbreakable plastics	8. 0. 0
E 283	Milk teeth, developing, natural size, on stand, made of unbreakable plastics	6.15. 0
E 287	Half of mandible, with submaxillary gland and with upper lingual gland, c. triple natural size, 11 parts, made of unbreakable plastics	14.15. 0
E 297/a-c	Three dental models, c-5-fold linear enlargement on stand, made of unbreakable plastics, (a) healthy incisor-tooth; (b) carious molar tooth with three roots; (c) carious molar tooth with two roots and granuloma	8. 0. 0

* Please order by Catalogue Numbers.	Approx. total cost	£49.15. 0
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(2) Recommended Journals

<u>Journal</u>	<u>Source</u>	<u>Approx. Yearly Subscription in £ N.Z.</u>
The Dental Practitioner and Dental Record	John Wright & Sons Ltd., Bath Road, BRISTOL 4. <u>N.Z. Agents:</u> N.M. Peryer Ltd., <u>CHRISTCHURCH</u>	£2.17. 6
Australian Dental Journal	Australian Dental Association B.M.A. House, 135 Macquarie Street, SYDNEY.	£1.18. 6
International Dental Journal	A. Sijthoff, 37 Wagenstraat, HAGUE, HOLLAND. Cassell & Co. Ltd., 37/38 St Andrew's Hill, LONDON, E.C.4	£2. 2. 6
Journal of Dentistry for Children	American Society of Dentistry for Children, Mount Royal & Guilford Aves., BALTIMORE 2, MARYLAND.	£1.16. 0

<u>Journal</u>	<u>Source</u>	<u>Approx. Yearly Subscription in £ N.Z.</u>
N.Z. Dental Journal	New Zealand Dental Association, Lister Buildings, Victoria Street East, AUCKLAND, C.1.	£1. 5. 0
Dental Abstracts	Americal Dental Association, 222 East Superior Street, CHICAGO 11, ILLINOIS.	£2.10. 0

Approximate total yearly subscription for above journals: £12. 9. 6

(3) Recommended Textbooks

NOTE: All the following textbooks are obtainable through Messrs N.M. Peryer Limited, P.O. Box 833, Christchurch, N.Z., the New Zealand Agents.

MCSBY DENTAL BOOKS, 1964-65

<u>Author(s) and Title</u>	<u>Approx. Price in £ N.Z.</u>
Ash - A Handbook of Differential Oral Diagnosis	2. 5. 0
Goldman, Schluger, Cohen, Chaikin and Fox - An Introduction to Periodontia	2.16. 0
Hine - Review of Dentistry	3. 3. 0
Kerr, Ash and Millard - Oral Diagnosis	3.17. 0
Irby & Baldwin - Emergencies and Urgent Complications in Dentistry	3. 0. 0
Kruger - Textbook of Oral Surgery	5. 5. 0
Bernier - The Management of Oral Disease	5. 5. 0
McDonald - Pedodontics	3.10. 0
Peterson - Clinical Dental Hygiene	2.10. 0

W.B. SAUNDERS COY'S. DENTAL PUBLICATIONS, 1965

Dorlands - Illustrated Medical Dictionary	5. 0. 0
Gehl and Dresen - Complete Denture Prosthesis	3.17. 0
Simon - Clinical Operative Dentistry	3. 7. 6
McCall and Wald - Clinical Dental Roentgenology	3.10. 0
Francis and Wood - Dental Pharmacology and Therapeutics	2. 5. 6
Glickman - Clinical Periodontology	7. 7. 0
Nizel - Nutrition in Clinical Dentistry	3.10. 0

*The New Year Book of Dentistry, 1964-65 Series 3. 4. 0

Approximate total cost of Recommended Textbooks £63.12. 0

* A new volume is published each year in March - To be ordered each year.

It is further recommended that the Dental Officer in Charge should preserve any pathological specimens, obtained as the result of operations, for instructional purposes, i.e. dental cysts, jawbone sequestrae, teeth with developmental defects and abnormalities (hypercementosis, ankylosis, gemination, hypoplasia, enameloma), etc.

It is also suggested that the Dental Officer in Charge write to

"Dental Times Editorial Offices,
38 East 57th Street, New York 22,
N.Y., United States of America ",

and request that his name be added to their mailing lists.

"Dental Times", a Newspaper for the Dental Profession, is a monthly newspaper designed to report on dental activities and research developments at home and abroad. It is distributed without charge to all members of the dental profession.

K. DENTAL HEALTH EDUCATION ACTIVITIES

The dental health education activities already undertaken should be continued and expanded with vigour and implemented by other activities.

Reference should be made here to Table XVIII, "Prevalence of Toothbrushing", and Figure VII, which shows the position in graph form, and mention made of the relatively large group of school children who have been rated as "seldom" brushing their teeth.

School hours in the winter season are from 8.15 a.m. to 1.30 p.m.; in the summer season, 8 a.m. to 1.15 p.m. There is an interval break of 20 minutes, from 10.30 a.m. to 10.50 a.m. to partake of food and school milk. Toothbrushing is required to be carried out also during this break immediately after the milk session. Twenty minutes is just not a long enough period for the activities to be completed and the result is that many children are denied the opportunity of brushing their teeth regularly every day.

However, the writer understands that the Administration and the Education Department are studying the question of amending the school hours and the length of the mid-morning break. It was mentioned that consideration was being given to revert to the position in 1956-57 when the break was one of 30 minutes.

The writer would strongly support such a move which could only have beneficial results in the field of dental health.

Regarding the ingestion of fluoride tablets, greatly added protection to developing permanent teeth would be achieved if the tablets could be made available to children up to Class 6. But the problem is, how can this be done? After much thought the writer can only leave the problem with the authorities with the suggestion that the Education Department may be able to assist. Even if a child received only 5 tablets a week during school terms, definite benefit to dental health would accrue.

In "selling" dental health education to the public the assistance of visual aids and printed material is most essential.

Stories should be produced for use in schools. Factual and simple dental health folders, pamphlets and posters should be designed and published for controlled free distribution. These activities should now also be directed to the adult age groups.

Accompanying the Report are samples of some of the teaching material prepared and used by the Division of Dental Health, New Zealand, and the Committee on Dental Health of the New Zealand Dental Association.

However it must be appreciated that educational material from overseas, and that includes New Zealand, is rarely suitable for use locally in its original form. Material used must have complete local application. This should present no great problem as the writer confidently anticipates that the Director, Education Department, would be only too pleased to make the facilities of his Department available for the production of material. Perhaps the production of posters, flannel art sets, etc., would come within the normal compass of class work. Ideas, obtained from a study of the material in the Appendix, could be discussed with the Director by the Dental Officer in Charge, rough outlines prepared and handed over to class teachers as ideas in dental health themes for art work to be done by the children. The best of these efforts could then be mounted and put on exhibition in schools, stores and offices on a monthly rota system.

Stories could be re-written and issued in cyclostyled form for use in health lessons.

Pamphlets and Weekly Newsletter items, for the information of the adult population, should be prepared and published.

L. APPLIED RESEARCH

Epidemiological studies are essential to determine the prevalence, incidence and experience of dental caries and periodontal disease for the varying age and sex groups in a community.

A community is never too large and seldom too small to survey its dental health, and, regardless of the size of the community, the same basic reasons for doing a survey apply.

As has been mentioned previously in the Report, the data thus obtained is necessary for evaluating an existing programme and this is the yardstick by which, in due course, the effectiveness of the recommendations made in this Report, if they are approved and adopted, should be judged.

It has already been mentioned, too, that the data should be used as a basis for planning how the existing public dental health programme should be continued.

It is recommended, therefore, that the Dental Officer in Charge should carry out an epidemiological survey in 1975. The information in this present Report will

furnish the base-line data against which the progress and value of the dental health programme can be measured.

However, before the survey is carried out, it would be expedient to write to the Director, Division of Dental Health, Wellington, regarding the survey.

There are many lines of simple investigations that could also be undertaken, the results of which would make for important contributions to the literature, such as the following:-

- (1) A study to determine the effect of oral hygiene practice (toothbrushing) as a preventive measure in the onset of periodontal disease.
- (2) A study to determine the effects on the periodontal tissues, in an adult group, of scaling and/or scaling and polishing, at regular intervals over a stated period.

M. LEGAL ASPECTS

It is assumed that, under existing legal enactments in Niue, there is authority to permit the established types of dental personnel, as long as they are in the employment of, and under the supervision of, the Department of Health, to give such treatment, instruction and advice relating to the dental care of the population as the Department may, from time to time direct.

Should there be any doubts in this matter, it is suggested that the legal position be examined to determine whether any amendment of existing legislation may, or may not, be required to regularize the position.

N. IN-SERVICE TRAINING

If it is decided to adopt the recommendations in the Report, leading to a comprehensive service, then a decision to approve the following awards would be a consequential requirement.

It is recommended that Fellowships, under the usual conditions, be awarded to the two dental officers to enable them to undertake a period of 7 - 9 months of In-service Training in New Zealand.

There would be no monetary charges for the courses but sea travelling expenses, salary payments and arrangements for living accommodation would be the responsibility of the Department of Island Territories and the Niue Administration.

It should be mentioned that, in accordance with the requirements of the Dental Act, 1963, the Department of Health (N.Z.) would be required to seek the approval of the Dental Council of New Zealand for the officers to engage in dentistry during the

period of their stay in New Zealand under the supervision and control of registered dentists as arranged by the Department.

It is suggested that Makauli Poihega receive the award in 1967. He has had upwards of 19 years continuous service. His course could include such subjects as children's dentistry, health education, orthodontics, gold inlays, minor oral surgery, dental radiography, endodontia (root canal therapy), prosthetic dentistry and an introduction to the use of high-speed equipment in conservative dentistry.

Siona Talagi attended a course in 1958. It is suggested that he be granted the award in 1968 when he will have had upwards of 29 years continuous service. The subjects to which he could devote his main attention would include orthodontics, dental radiography, endodontia, periodontia, oral surgery and the use of high-speed equipment.

Endodontia, orthodontics, high speed operative work and periodontia (to some extent) are branches of dental practice in which the officers require education and instruction and practical experience under supervision.

This observation highlights the urgent need for an up-to-date authoritative reference library of textbooks and periodicals.

During the visit a young patient presented at the Hospital with acute Vincent's Infection or Ulcerative Necrotizing Gingivitis. A paper ("The Treatment of Vincent's Disease with Metronidazole") describing an investigation of a new treatment for Vincent's disease by the oral administration of a compound in tablet form appeared recently (April 1965) in the literature and the writer was able to recommend this treatment which had been proved to be a simple, safe and effective one.

This demonstrates the value of having ready access to recent publications.

O. UNIVERSITY QUALIFIED DENTAL OFFICER

It is most pleasing to the writer, and he anticipates that it will also be to both the Secretary, Department of Island Territories and the Resident Commissioner, that he considers it opportune and relevant to include a section under the above heading in the Report. He is in no fear that the sincerity of his purpose in doing so will be misunderstood by the present dental officer staff. They can take immense pride in their achievements, past and present. They have received many complimentary and eulogistic remarks on the standard of their work from a number of people in all walks of life.

Without belabouring the point too much, perhaps the writer may be permitted, for the sake of the record, to reiterate his long-held views, expressed again in relevant sections of this Report, by quoting as follows from the Foreword of the 1953 Report.

" This Report reveals that the present system of dental treatment in Niue Island is effective within the scope of work as defined by the principles adopted in 1940-41 when the scheme was initiated. The basis of a sound (public dental health) service has now been laid-----.

" The principle of training Niuean boys in dental work (has been) proved to be valid. It is only in this way, both from an economic and practical viewpoint, that an 'on the spot' dental (treatment) service can be provided for the population.

" The Assistant Dental Practitioners are held in high esteem. The patriarchal authorities in every village expressed thanks and gratitude to those responsible for giving their 'own young men' the opportunity to study dental work, so that when they returned to the Island, after the training period in Western Samoa, they were able to do this work for their own people.

" This acceptance by the people of the (public dental health) service is vital to the well-being of the service-----.

" To those versed in the psychology of the Polynesian peoples the significant implication of this acceptance will be fully appreciated, and every endeavour should be made to have this confidence further enhanced by now broadening the scope of the Service to (include) the pre-school age group - and finally the adult population-----.

" To have attempted to have given a full and comprehensive dental service to the whole population right from the commencement of the Service would not only have been impracticable, but also would have been psychologically unsound. One must face conditions, and financial considerations that require progress, while it may be steady, to be comparatively slow.

" The (Public Dental Health) Service in Niue is now ready to enter its second phase of development as will be seen by a detailed study of this Report".

So from a modest beginning the stage has now been reached after some 25 years of endeavour, as this Report essays to show, when the long-range objective of the public dental health programme is, at last, within sight of ultimate attainment, and that is, the establishment of a comprehensive service.

Although it may not have been readily apparent over the years this is the last and ideal goal that the writer has always kept firmly in mind. He has endeavoured to so plan his recommendations that further expansion and refinement of the dental programme has been able to be effected "painlessly".

Too, it has always been a guiding principle that the development of the dental programme should be related very closely to the current level of social, economic and educational developments within the community. In recent years there have been noteworthy developments in these fields, not least in education. The establishment of Paliati High School will undoubtedly increase the potential of students, sufficiently mature mentally and educationally, to ultimately merit entry into institutions of higher academic learning overseas.

Accordingly, it is recommended that a suitable and interested student be selected and granted a scholarship to enable him to eventually gain entry to the Otago University School of Dentistry and undertake the Bachelor of Dental Surgery (Otago) Course. It is hoped that by 1976 such a graduate would be available and who, after serving one year post-graduate period of internship in the dental department of a public hospital in New Zealand, and a year in the Division of Dental Health, to gain experience, would be eligible for appointment in Niue in 1978 as Principal Dental Officer of the Health Department.

The state of social, economic and educational developments anticipated within the next decade or so in Niue would merit such an appointment, and conform to the policy statements of world experts in the field of public dental health that the

fully qualified dentist must be regarded as the basis of a comprehensive service.

SELECTION OF STUDENT

It may be helpful to those in authority charged with the responsibility of selection of such a student to quote from the Report of the World Health Organisation Expert Committee on Dental Health⁽¹⁰⁾ on this aspect of Dental Education.

"SELECTION OF STUDENTS

There is no simple and single solution to the problems of selection of dental students owing to the differing structures of the educational systems in various countries, and the lack of agreement (for want of reliable data) on the best ways of evaluating the suitability of candidates. It is generally agreed that a potential dental student should possess the following qualities:

1. An acceptable level of scholarship and a capacity for further intellectual development.
2. A practical bias in his interests and hobbies.
3. Qualities of leadership, integrity and maturity of outlook to enable him to accept his future responsibilities as a professional man.
4. A satisfactory motive for wishing to enter the dental profession with some evidence of his likelihood of completing successfully the long and arduous education.
5. A level of physical and mental health which will ensure that he successfully meets the continuing and exacting requirements of professional life.

The means which have hitherto been employed to evaluate these qualities include:

1. Advisers' and teachers' reports covering
 - (a) factual data of academic performance
 - (b) opinion of teachers on intellectual maturity
 - (c) ability to undertake individual study
 - (d) known physical defects
 - (e) extra curricular activities, such as games, qualities of leadership and school positions held
 - (f) factual data on character and personality.
2. Various types of aptitude tests which may be designed to assess practical skills, intellectual capacity, and suitability from a psychological viewpoint.
3. A personal interview carried out by one or more individuals at differing points in the selection procedure.
4. In addition, in many countries an entrance examination, which may be competitive, is obligatory.

There is no evidence that any one or combination of these methods is reliable and so as many as possible of these should be employed. It is desirable that the final assessment, and in particular any personal interview, should take place as near as possible to the time of entry to the dental school. In the interests of sound educational procedures each school should set standards for admission and have the right to limit admissions and to exclude unsuitable applicants.

In both the students' and the public interest, the Committee strongly recommends that dental schools should establish methods to terminate the studies of those students who, after being admitted, make unsatisfactory progress. This should be done as soon as the students' unsuitability is determined. "

P. ESTIMATED COST OF RECOMMENDATIONS
INVOLVING EXPENDITURE

Item	Approx. Cost	Financial Year Suggested Come to Charge
Equipment required now	£ 318. 17. 0	1965-66 (1)
Extensions and alterations to main dental clinic	1,500. 0. 0	} 1965-66 } 1966-67
Fire Extinguishers	47. 3. 6	1966-67
Anatomical Models	49. 15. 0	1966-67
Textbooks	63. 12. 0	1966-67
Periodicals	12. 9. 6	1966-67 (2)
Pump chair	140. 0. 0	1967-68
In-service training - Return fare to N.Z.	125. 0. 0	1967-68
High speed equipment	300. 0. 0	1968-69
In-service training - Return fare to N.Z.	125. 0. 0	1968-69
Bursar student to attend the University of Otago Dental School	?	1970-71 ?

- (1) It is understood that this amount is available from the 1965-66 vote of the Health Department.
- (2) This amount will recur annually.

PART VIIACKNOWLEDGMENTS

The writer wishes to express his appreciation to the Resident Commissioner and his Officers for their guidance and co-operation, without which it would not have been possible to carry out and complete the mission.

In particular he is indebted to the Chief Medical Officer, the Dental Officer in Charge and the individual members of the dental staff, the Acting Director of Education and the Superintendent of Works, without whose assistance the basic material and information for the Report could not have been obtained.

He also desires to thank the Resident Commissioner for the courtesy in making time available to give him the opportunity of speaking to the Members of the Niue Island Assembly.

He is grateful to the Principal Dental Officer (Research) and his assistant, Division of Dental Health, Wellington, for their help.

Finally, he wishes to record his deepest appreciation and sincere thanks for the boundless hospitality and many kindnesses extended to him, during his stay on Niue, by his host and hostess, Mr and Mrs Siona Talagi.

PART VIIISUVA VISIT

At the beginning of September a "stop-over" visit of three days was made at Suva, Fiji, on the return trip to New Zealand. This enabled the writer to see the Fiji School of Medicine and the Dental Clinic, Department of Health.

Courtesy visits were made to:-

Dr C.H. Gurd, Director of Medical Services, and

Dr D.W. Bookless, Deputy Director of Medical Services.

The writer desires to express his appreciation to Mr K.J. Gilchrist, F.R.C.S., Principal, Fiji School of Medicine, for his kindness in making himself available to show the writer over the School and let him see something of the physical facilities available for the teaching of dental students in their basic sciences.

He is also indebted to Mr D.M. Ellerton, Senior Dental Officer, and his staff, for the time given to him in discussion and showing him the Dental Clinic and equipment.

The visit was a worthwhile and stimulating experience associated as it was with the official tour of duty to Niue.

The writer also wishes to thank Mr Gilchrist and Mr and Mrs Ellerton for their very enjoyable hospitality.

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PART XADDENDUMA. LOCAL REMEDIES FOR SOME DENTAL DISEASES

As the use of local remedies has generally ceased in more recent years, it is considered fitting that the treatments, outlined in writing by the dental officer staff in 1953, should now be placed on record as part of the addendum to the Report^(a).

1. Remedies for Toothache

- (1) Chew several young guava leaves. This does not always relieve the pain.
- (2) Rinse the mouth out with sea water, preferably warmed.
- (3) Take six pieces of clean kaka (the brown outside covering sheath of young shoots of developing coconut fronds) and five leaves of the uhi bush (Evodia hortensis Forster - an introduced ornamental shrub). Place them sandwich-wise and put in the mouth and chew carefully. It is alright "if some of the medicinal juice is swallowed".

NOTE:- Dried uhi leaves are very aromatic. They are also used to scent baths. "Branches waved about in a room will chase the ghosts away".

2. Treatment for Infants with Thrush

Take one piece of bark of the fekakai tree (mountain apple tree) and one piece of bark of the vi tree (venus apple tree) and wrap them in two layers of clean kaka. Soften the pieces of bark by pounding on a piece of wood. Remove the outer layer of kaka and throw it away. Soak the other, with the softened bark inside, in a cup of water and squeeze it with the fingers. The infusion is brown coloured and is given to the infant to drink. The "medicine" is given three times daily.

The infant is not allowed to eat foods with a red or reddish colour, such as, uga (crab) because it is red when cooked, tinned meat, malau or selekihi (red fish), or raw foods (in all "witch-craft" practices raw food is strictly forbidden), because it is thought that such foods will make the condition worse.

The name for thrush is pala (or popo) gutu. "Gutu" means "mouth" and "pala" or "popo" means "rotten" or "sore". Another name for thrush is kulakula. "Kula" means "red" and, naturally, "kulakula" means "red-red". The condition causes very red gums, hence the name and the prohibition on eating red foods.

NOTE:- Thrush is an inflammatory mouth condition seen among infants. It is a fungus and is infectious. Therefore all eating utensils used by the infant must be sterilized. Absolute cleanliness of all feeding equipment usually prevents the condition.

Up until the mid-1940's cases of thrush occurred frequently but advice on infant feeding given by the Baby Welfare Service resulted in a rapid fall in the incidence of the disease. Today, cases only occur infrequently.

3. Treatment for Gingivitis and Periodontal Diseases

Pieces of bark from the following trees are obtained:-

- (1) Fekakai (Mountain apple tree)
- (2) Vi (Venus apple tree)
- (3) Telie (Indian almond tree)
- (4) Milo (Portia tree)

The barks are not weighed or measured. The pieces are pounded to soften and powder them and they may be used singly or as a mixture.

A portion of powder is wrapped in a clean piece of kaka and soaked in a cup of water and squeezed with the fingers. The resulting brown coloured infusion is given once, twice or three times a day. There is no way of determining the strength of the "medicine" but the amount is measured by the width of the index finger, so many "fingers" according to the age of the patient.

The patients are given the "medicine" to drink as it is thought that these inflammatory oral diseases are caused by stomach upsets. Adolescents and adults with sound teeth are sometimes given the bark to chew. The juice is swallowed and the fibrous parts of the bark are expectorated.

The following notes about the trees may be of interest^(b).

- (1) Fekakai (Eugenia malaccensis L.)

A medium to large tree with simple leaves. The flower is red and the fruit obovoid-shaped, fleshy, red and one-seeded. The flesh is edible. The tree grows in open forest terrain.

- (2) Vi (Spondias dulcis Parkinson).

A medium to large tree with compound leaves. The flowers are small and whitish and the fruit is oval-obovate with edible yellow flesh. The tree is occasionally found growing near dwellings.

- (3) Telie (Terminalia catappa L.)

A medium to large tree with simple leaves. Flowers are small and greenish-white and the fruit flattened, red and fleshy. The tree is common on cliffs near the sea. The trunks are used for making canoe hulls.

- (4) Milo (Thespesia populnea (L) Sol.)

A medium-sized round topped tree with simple leaves. Flowers are yellow with red centres and the fruits are dry capsules containing numerous hairy seeds. The tree grows on lower terraces near the sea. An extract of the fruit is used as a purgative.

B. SOME RECIPES FOR LOCAL DISHES^(a)

Attention has been drawn in the Report to the fact that the disproportionate use of imported refined foods in more recent times has been cited as the main cause of the increase in the prevalence and incidence of dental decay.

It is opportune, therefore, to re-emphasize the importance in the daily meal pattern of dishes using mainly natural foods (with the addition, if desired, of refined foods in more "proper" proportions) by including in the addendum these few recipes.

(1) Faikai Ika

Slice a cooked or raw piece of fish. Place in a cured banana leaf (a leaf softened over a flame or fire). Add sliced onions and some coconut cream and a little salt to season. Close banana leaf by bringing edges of leaf together at the top. Wrap in several cured banana leaves and tie at top with cane "string". Bake in oven for an hour.

(2) Polo Luku

Clean some young shoots of bird's nest fern tops and place them on a cured banana leaf. Add coconut cream and a little salt. Close banana leaf at top and wrap in several cured banana leaves tied at top with cane "string". Bake in oven for one hour.

(3) Nane

Put some coconut milk in a pot and add grated soft kernel (meat of the coconut) and bring to the boil. Add arrowroot starch, a little at a time, to thicken to desired consistency. Keep stirring with spoon. Add sugar to sweeten.

(4) Pitako Futi

Skin some green bananas, grate them and mix with coconut cream. Add sugar to sweeten. Wrap mixture in cured banana leaves and bake in oven for one hour.

(5) Holo Kaufi

Peel several tubers of tapioca, grate them and mix with coconut cream and white flour. Divide mixture into portions and roll them (like loaves) ready for baking. Wrap portions in cured banana leaves and bake in oven for one hour.

(6) Tuki Mei

Peel ripe bread-fruit and mash in wooden bowl. Add arrowroot starch (for thickening) sugar and coconut cream. Divide mixture into portions and wrap them in cured banana leaves. Cook in umu (oven) for one hour.

(7) Tuki Simala

Boil some sweet potatoes. Then peel and mash them. Add arrowroot starch for thickening, coconut cream and a little salt. Divide mixture into portions and wrap them in cured banana leaves. Bake in oven for one hour.

(a) Nemaia, H. and Talagi, S., Personal communications, 1953.

(b) Yuncker, T.G., Bernice P. Bishop Museum, Bulletin 178, 1943.

APPENDIX I

THE DENTAL ATTENDANT

Suggested Partial Outline of Notes
for Course of Instruction

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THE DENTAL ATTENDANT

Suggested Outline of Notes for Course of Instruction - - - - -

(These notes could also be included in a curriculum for dental hygienists).

INTRODUCTION

DENTISTRY

Dentistry is a term employed to designate a system of health care for the teeth. It is applied to services, both preventive and curative, as furnished by specially-trained persons known as dental officers assisted by two types of auxiliary workers, i.e., dental hygienists and dental mechanics. Dental health services include advice regarding diet intended to prevent dental decay, placing fillings in teeth already decayed and extracting badly-diseased teeth, and the construction of artificial substitutes for missing teeth, as well as recommendations to the patients on the daily care of the teeth and mouth at home.

OLDER IDEA OF DENTAL CARE

Dental care was originally thought of as having to do simply with the relief or prevention of pain or the improvement of appearance, with secondary consideration for maintenance of ability to chew food. These earlier conceptions were based on the belief that disease of the teeth or their supporting structures had its effect only in the mouth and did not affect other parts of the body.

NEWER IDEAS

It is now known that infections that have become established in and around the teeth may cause serious damage elsewhere in the body. Inability to masticate food properly may cause digestive disorders. Also, facial disfigurement, due to irregular or missing teeth, may cause severe mental disturbance. Dentistry, which is charged with caring for all diseases and malformations of the teeth and their supporting tissues has therefore come to be known both by doctors and dentists as a health service.

As dentistry has increased in stature and importance with these changing ideas and has improved its methods of caring for dental disorders, it has also revised its objectives and to-day endeavours to provide a wider range of service to those who seek its assistance. Dental officers are not only attempting constantly to improve their methods of treating dental disease, once it has started, they are also endeavouring to prevent the incidence of new cavities and the recurrence of diseases of the gums. Each operation is planned with an eye to the future. Preservation of the tooth being treated is not the only consideration. Attention is also paid to the possible influence of the treated tooth on the health of the body.

With the objective of improved health service together with prevention of disease in mind, dental officers are engaging in public health activities, both as officers in the health department developing preventive campaigns and as staff members of health

department dental clinics set up for the provision of preventive dental health services.

SPECIALTIES AND SPECIALISTS

Dentistry, as already noted, has developed many new techniques for dental care. Since some of these require special aptitude and special training, it naturally has come about that dental officers, who have become highly qualified in specialised fields, have limited their practices to those fields. Thus a group of specialists has been developed in dentistry. The first specialty to emerge from and be carried on separately from general practice was ORTHODONTICS, which has to do with correcting irregularities of the teeth. Other specialties which have become well-established are ORAL SURGERY, extraction of teeth and performance of other surgical operations on the jaws; PERIODONTICS, treatment of diseases of the gums; PROSTHODONTICS, construction of dentures (artificial teeth) and bridges to replace missing teeth; PEDODONTICS, the treatment of children's teeth.

Section I

DUTIES OF THE DENTAL ATTENDANT

THE DENTAL SURGERY

Since dental operations can best be performed with the patient seated in a specially-constructed chair, and since many operations require the use of equipment that is not readily transported, dentistry is almost universally practised in rooms in which the equipment is permanently set up. However, it will be necessary in Niue for dental officers and dental auxiliary workers to go on tour from time to time, using a mobile dental clinic, so that those people living outside the main centre can obtain dental treatment more readily.

Equipment has increased in range and instruments have increased in number and complexity with advancement in knowledge and improvements in techniques.

This means that the carrying on of dental practice not only involves the acquisition of knowledge and skill by the dental officer, but the setting up of an establishment for practice in which a specialised form of housekeeping must be put into operation. Rooms must be kept clean and properly aired. Instruments and appliances must be sterilized and placed in order in cabinets, where they will be instantly available when needed. The responsibility for all this falls on the dental attendant.

The productive capacity of a dental officer is directly related to the efficiency and co-ordination of his staff. Unless his materials are prepared accurately and their mixing timed to co-ordinate with his operative requirements, his operative skill will be lessened. In fact, dental officers depend on the efficiency of their dental attendants for much of their success in practice.

The dental clinic is a place where health services are given. And, just as the swimmer feels more secure if he sees that the life-guard is a robust physical specimen, so the dental patient will feel reassured as to the quality of the health care he will get if he is aware that health is well-established in the clinic. The dental attendant can aid in the establishment of the desired atmosphere by keeping himself physically fit and, with this end in view, he should be enthusiastic about practising what

the dental officer preaches.

While the dental officer is primarily interested in the dental health of his patient, he is properly concerned, as well, to see that his clerical records, returns, supplies of stores (drugs, filling materials, etc.) and stationery are effectively controlled and kept up-to-date in order to avoid unnecessary and irritating delays. Dental officers must, therefore, also possess a "business" side, which must be as efficient as their professional side. However, it is the dental attendant who, under the general supervision of the dental officer, is expected to be responsible for most of the business details.

QUALIFICATIONS OF DENTAL ATTENDANTS

The duties of the dental attendant have been indicated in outline and it follows that he is expected to be conscientious, honest, neat, and well-groomed, fresh and clean-looking, not over-weight, healthy and with a good carriage, and at least fairly intelligent. In addition, he should possess dignity, a sense of proportion, and, above all, a sense of humour. Good-looking teeth are important. He should have a pleasant personality and should be an extrovert without being aggressive, sympathetic to the patient's ills even when imaginary. He really becomes the public relations department of the clinic. In fact, he is secretary, housekeeper, and operative helper in one. The dental attendant's duties are probably as varied as those of any other position in the public dental health service.

Because the dental officer's time is valuable, the dental attendant must see to it that he understands, as far as possible, each technique that he is to be taught. These techniques will be described briefly and concisely, with the hope that the dental attendant will approach each one with at least a fundamental understanding of its purpose as well as its method.

During the early period of learning, notes should be kept at hand ready for reference.

Daily Duties:

Briefly, the routine is as follows:-

The dental attendant should arrive at the clinic "on time" each morning. He should immediately ventilate the rooms, clean and tidy the waiting-room and surgery, prepare the gowns and other linen, and plan the day's routine according to the appointment book.

He should sterilize any instruments required and have everything laid out in readiness for the first patient within half an hour of commencing duty. He should place the charts of each patient in order, so that the dental officer will have complete information on every patient before he is brought into the surgery.

He should wash his hands before assisting at the chair-side.

He should know and lay out the instruments required for each individual operation. He should be an "extra pair of hands" at the chairside and, by familiarizing himself with the technique of each operation, learn to anticipate the dental officer's requirements. When the original clinical examination is made, he will mark each cavity on the chart, in pencil, as it is called. This is a most important time-saver, as it obviates a complete re-examination of the patient at each subsequent visit.

He is responsible for keeping all other records - including the daybook recording the patient's name, operations carried out and time of arrival and departure, and the appointment book. He will issue appointment cards and prepare monthly returns and diaries for the dental officer's signature. An important part of his work is keeping a check on supplies of stores, equipment, and stationery.

He is responsible for the mixing of alloys and cements, the sterilizing of instruments, and their systematic lay-out in the cabinet.

Some of his time will be spent at the telephone, and his telephone personality is especially important, because often it is the means of attracting patients and parents; a poor telephone personality can be a means of repelling them. When speaking on the telephone, he should be definite and concise. Yet, at the same time, he should be pleasant and friendly. When making telephone appointments, it is unwise to suggest an alternative appointment until the first one is refused. When the appointment is accepted, the patient is asked to repeat the date, and the time, back to the dental attendant, and the appointment may be confirmed by sending an appointment card. If this is done patients should be requested to present their cards when they attend at the clinic to avoid possible disputes concerning the time of appointments.

The dental attendant is also responsible for linen and laundry and the replacement of stock. He orders from a "wanted" list, to which he adds as shortages are foreseen. Adequate reserves of items listed in the standard lists of Dental Stores should always be maintained.

Dental attendants should thoroughly appreciate the necessity for asepsis and the value of cleanliness. From the patient's point of view, asepsis does not necessarily mean cleanliness. A mug may be boiled in a sterilizer for three or four minutes, but if it is handed to the patient still smeared with lipstick, the fact that the mug is sterile will not be entirely appreciated. The patient will think the mug is still dirty.

Dental attendants should also appreciate the patient's mental and physical viewpoint. Apart from the sympathetic consideration, a good practical test is to sit in your own clinic chair for a while and see, for instance, what can be observed under the bracket table. Similarly, a few moments in one's own waiting-room often prove very informative.

Section II

THE TEETH - DECIDUOUS AND PERMANENT

The dental attendant's duties revolve around teeth and their supporting tissues, the disorders to which they are subject, the treatment and prevention of those diseases, and the replacement of teeth when they are lost. He will approach his work more intelligently and with greater interest if he knows something about teeth and their structure, and the diseases that affect them.

It is common knowledge that man has two sets of teeth; the deciduous (or "baby") teeth - literally those that fall out or are shed - and the permanent teeth, which are supposed to last a "lifetime". Few people appreciate the reason for having two sets

and no more (third sets are sometimes reported, but are not usually authentic). People assume that the deciduous teeth wear out, or are not as strong as the permanent ones, so must be replaced. Actually the reason is that teeth are needed very early in life to chew food. But at that time the head and jaws are small, so the teeth must be small and relatively few in number. As the head and jaws grow and the food (and chewing) requirements of the body increase, more and larger teeth are needed. Nature arranges it so that the last teeth to come in (erupt) make their appearance only when the body and the head and jaws have nearly attained their full growth. Those are the so-called "wisdom" teeth.

The Deciduous Teeth

The deciduous set of teeth is shed and replaced in a continuous process beginning at five or six years of age. Most of the permanent teeth are larger than the deciduous teeth they replace or supplant. This makes for the harmonious dental-facial relationship that contributes so noticeably to appearance.

* The deciduous set consists of 20 teeth. The time of their eruption varies considerably. The first teeth to come in, usually the lower incisors (front teeth), may erupt as early as the 5th month of life or as late as the 12th. The second molars, the last to erupt, usually come into the mouth by the 24th or at least the 30th month. (Technical names and letters applied to deciduous teeth should be detailed by the dental officer).

The first permanent tooth to erupt is, usually, the first molar. This replaces no deciduous tooth, but, instead, appears behind the deciduous second molar at between 5 and 6 years of age (because of this it is often called the "six-year molar"). It is usually possible to tell which are the deciduous teeth because they are smaller and whiter than the permanent teeth. In some cases the dental officer may have to decide.

Of the deciduous set, the first teeth to be shed and replaced are the incisors - lowers first, then uppers later. The second deciduous molars are not shed until the child is 11 or 12 years of age. No deciduous tooth should be lost until its proper time, hence dental care for these teeth is important.

The Permanent Teeth

There are 32 permanent teeth. Following eruption of the first molars at 5 or 6 years of age, the lower incisors come in at 6 or 7 years. The upper incisors appear at 7 or 8 years. From that point on, there is a steady growth and eruption of permanent teeth up to 12 years. The third molars or wisdom teeth normally erupt at 17-21 years; they may still erupt later or be unable to erupt because of impaction. (Permanent teeth are known technically by numbers.)

All the teeth begin to form long before they erupt, and the quality of tooth structure is largely determined by the nutritional and health influences brought to bear on the child during the formative period. The time of formation and eruption of the deciduous and permanent teeth is as follows:-

The names of the teeth, together with their position in the mouth, are as follows:-

* These notes should be supplemented with suitable diagrams, pictures and models.

CHRONOLOGY OF THE HUMAN DENTITION
(Modified from Logan and Kronfeld)

<u>Tooth</u>	<u>First Evidence of Calcification</u>	<u>Eruption</u>
<u>Deciduous Dentition</u>		
(A) Central incisor	5 mos. in utero	6 - 8 mos. (6)
(B) Lateral incisor	5 mos. in utero	8 - 10 mos. (9)
(C) Cuspid	6 mos. in utero	16 - 20 mos. (18)
(D) First molar	5 mos. in utero	12 - 16 mos. (13)
(E) Second molar	6 mos. in utero	20 - 30 mos. (26)
<u>Permanent Dentition</u>		
(1) Central incisor	3 - 4 mos.	6 - 7 yrs. (7)
(2) Lateral incisor	3 - 4 mos.	7 - 9 yrs. (8)
(3) Cuspid	4 - 5 mos.	9 - 12 yrs. (11)
(4) First Bicuspids	1 $\frac{3}{4}$ - 2 yrs.	10 - 12 yrs. (10)
(5) Second Bicuspids	2 $\frac{1}{4}$ - 2 $\frac{1}{2}$ yrs.	11 - 12 yrs. (11)
(6) First molar	at birth	6 - 7 yrs. (7)
(7) Second molar	2 $\frac{1}{2}$ - 3 yrs.	11 - 13 yrs. (13)
(8) Third molar	9 - 12 yrs.	17 - 21 yrs. (21)

Structure of Teeth

All human teeth have three parts - crown, root, and cervix or neck, the latter being simply the point where the crown ends and the root begins. The tooth is made up of four tissues - enamel, dentine, cementum, and pulp. The body of the tooth, both crown and root, consists of dentine, a hard tissue somewhat denser than bone. The crown is covered by a thin layer of enamel, which is much harder than dentine. This ends at the cervix (neck) where it meets the cementum, a thin hard tissue covering the root. In the centre of the tooth is a soft tissue supplied with blood vessels and nerves, called the pulp; this is the "pain" centre of the tooth.

The teeth vary as to the number and size of roots, this variation being related to the size of the crown and the amount and direction of stress the different teeth are subject to in the performance of their functions. The anterior teeth (incisors and canines) have one root each. The bicuspids (premolars) also have one root, with the exception of the upper first bicuspids, which has two. The lower molars have two roots each, and the upper molars three.

In the deciduous dentition (set of teeth), the anteriors have one root each, the lower molars, two, and the upper molars, three, as in the permanent dentition. A characteristic of the deciduous molar roots is that they are spread wide apart. This is to accommodate the developing crowns of the bicuspids (premolars) which are to succeed them.

The teeth are supported, in the performance of their functions, by an extension of the jaw-bone known as the alveolar process, a bony tissue which surrounds the roots of the teeth. The roots do not, however, come in direct contact with the bone itself, but are attached to and cushioned in their bony sockets (alveoli) by ligamentous tissue called the periodontal ligament. Covering the alveolar process and fitting snugly around the cervix of each tooth is a soft tissue called the gingiva or

gum. The gingiva is firmly attached to the cementum of the tooth root at the cervix. There it is continuous with the periodontal ligament with which it blends at the border of the alveolus. The gingiva, periodontal ligament, and alveolar bone are supplied with blood vessels and nerves.

The gingiva also is continuous with the mucous membrane lining the lips and cheeks and covering the palate and the floor of the mouth. The mucous membrane of the tongue is of a specialized type designed to accommodate the so-called taste-buds. (Explanation of terms: mesial, distal, buccal, labial, lingual, palatal, occlusal, and combinations and abbreviations.)

Teeth and Nutrition

The enamel, dentine, and cementum are called calcified tissues; that is, they consist very largely of compounds containing calcium. The bones of the body, including the alveolar process, are also calcified tissues. Calcium is a mineral distributed quite widely in nature; it is found in various foods and, in very small amounts, in most drinking-water. Calcium must be supplied to the body in adequate amounts, if the teeth and the bones are to be properly formed.

Since the deciduous teeth begin to form several months before the child is born, it follows that calcium-bearing foods must be given the mother fairly early in pregnancy. If the mother nurses the baby, she has a continuing need for calcium in her diet, since her milk must supply calcium for the growing infant.

While calcium is found in a number of foods, the best source, as regards amount, is milk. Milk should therefore be an item in the daily dietary, at least until all the teeth, both deciduous and permanent, are fully formed.

Calcium is best assimilated and utilized in the body if Vitamin D, found in nature most abundantly in cod-liver oil, is also provided. Another vitamin that has an important bearing on the health of the mouth is Vitamin C, found in oranges and other citrus fruits and in tomatoes. It is particularly related to the health of the gingivae (plural for gingiva), as is Vitamin B1. All the known vitamins have a bearing on general health and react indirectly and sometimes directly on the gingivae, tongue, and other soft tissues of the mouth.

Section III

DENTAL CARIES

Dental caries is the technical name for tooth decay. It is the process that causes cavities to form in teeth. Caries always starts on the outer enamel surfaces of the tooth and, by extension, invades dentine under the affected part of the enamel. Some teeth, as for example the molar, often have crevices called pits and fissures which lead directly into, or nearly to, the dentine; in these locations caries may occur without seeming to affect the enamel at the outset. Caries does not start, however, in the interior of the tooth. Unless checked by removing the decayed tooth structure and filling the cavity, caries burrows into the pulp, giving rise to severe pain (myelitis) and later, if not cared for, causing another painful condition known as alveolar abscess.

Dental caries is regarded by most authorities as being primarily a process beginning with decalcification or dissolving of the calcium salts of the enamel. This solution of calcium salts is effected by acids that are produced by certain bacteria commonly found in the mouth, acting on starches and sugars left in food retention areas after a meal containing these substances.

After some of the calcium salts have been removed from the enamel, the food and bacteria can penetrate into this tissue, producing more acid, dissolving more enamel, and permitting further ingress of the bacteria.

Progress through the enamel is slow, except where pits and fissures occur, but when the bacteria reach the dentine they proceed more rapidly because dentine is porous, due to the presence of numberless branching tubules. Here the bacteria decalcify the hard structure of the dentine and also digest and liquefy the organic contents of the tubules.

Caries may start on any part of the tooth where bacteria and food can collect and remain for long periods of time. In other words, caries starts on unclean surfaces. The pits and fissures already mentioned offer ideal places for the lodgment of bacteria and food. They may also find a lodging place on the approximal surfaces of the teeth, since these are usually in close contact with the corresponding surfaces of adjacent teeth and are not readily reached by the bristles of the toothbrush during cleaning. Sometimes areas near the cervix or "gum line" on the buccal and labial surfaces are not kept clean, and these areas may then become the sites of dental caries.

Childhood is the age of greatest susceptibility to the start of dental decay, and also the period when it progresses most rapidly. Decay may set in very soon after the tooth erupts; this is especially true of the molars, both deciduous and permanent. Because of this fact, decay is found in the mouths of pre-school as well as school children; it is often found in children as young as two years of age.

Because of this period of susceptibility, special measures have to be taken to give children's teeth effective care.

Dental decay is often very active during adolescence, but tends to become less active after the age of eighteen or twenty.

Inflammation of the Pulp (Myelitis)

It was stated that when dental decay reaches the pulp, it causes severe pain. This is because the pulp is well supplied with nerves as well as blood vessels. The bacteria and their products, acting on the pulp, cause inflammation of that tissue and ultimately it loses its vitality and becomes putrescent. The bacteria then penetrate this putrescent material, following along through the root canals to emerge finally into the tissue around the apex of the root. Inflammation of this periapical tissue then begins.

Abscess Formation (Acute and Chronic Alveolar Abscess)

Periapical inflammation, like myelitis, causes intense pain. As this tissue becomes more severely affected, pus forms and begins to burrow through the bone, attempting to find an exit on the surface of the mucous membrane, over the alveolar process. This produces what is known as an alveolar abscess. It causes swelling of

the nearby tissues of the jaw and face, which subsides after the abscess "breaks" or is lanced, permitting the pus to drain away into the oral cavity (mouth).

Control of Dental Caries

Control of dental caries may be achieved either by preventive measures or by suitable treatment, if it has already started. Preventive measures may consist of dietary control (as advised by the dental officer), by home care of the teeth (proper use of toothbrush, etc.), cleaning of teeth by the dental officer or dental hygienist or by application of some chemical compound (such as sodium fluoride) to the teeth by the dental officer or hygienist. The cleaning of the teeth by the dental officer or hygienist is called "oral prophylaxis" or just "prophylaxis".

Treatment after decay has started consists of complete removal (excavation) of the carious tooth substance by the dental officer and the placing of a filling. Since this operation prevents further extension of the decay and protects the pulp from infection, it is called "protective dentistry". This is to distinguish it from "preventive dentistry", a term applied to the measures mentioned in the preceding paragraph.

A satisfactory filling must meet the following requirements as nearly as possible:-

1. It must completely fill the cavity so that no saliva, food particles or bacteria can enter around its edges or margins (such seepage would lead to a recurrence of decay).
2. It must be permanent, i.e., must neither dissolve in the fluids of the mouth nor wear away too much under the force of mastication.
3. It must not irritate the pulp tissue by chemical action in the tooth or by transmitting thermal changes.
4. It should present a pleasing appearance and must not discolour the tooth.

(The various filling materials and their manipulation should be explained by the dental officer).

Section IV

PEDODONTICS AND ORTHODONTICS

Dental officers have come to realise in recent years that care of the teeth during childhood is not only a valuable service in that period, but plays an important part in the whole dental life history of the individual. They have, accordingly, developed special techniques for dealing with the problems that are peculiar to teeth during the childhood years. These techniques relate to the placing of fillings, the treatment of infections, and particularly to the correction of irregularities (malocclusion) of the teeth. Out of these developments have come two specialities. Pedodontics is a word coined from the Greek words for "child" and "tooth". It consequently refers to dental practice for children. Orthodontics comes from the Greek words for "straight" and "tooth". It refers to procedures, especially the use of appliances (wire, springs, and plates) to bring crooked teeth into line.

As stated in the section on dental decay, children's teeth often begin to decay at a very early age. This means that fillings must also be placed at an early age if the decayed teeth are to be preserved. Many parents do not realise the importance of keeping the child's teeth in a healthy condition by the early detection of caries and the filling of cavities, and so the deciduous teeth have often been neglected. This is due in a large part to the mistaken assumption that, since they are eventually to fall out and be replaced by permanent teeth, they are not important.

Actually the deciduous teeth are needed for the mastication of food until the permanent teeth come in. In addition, the deciduous teeth have an important function, that of maintaining space for the eruption of the permanent teeth that are to follow them. Neglect of the deciduous teeth means toothache, infection, and need for extraction. Loss of these teeth will lead to irregularity of the permanent teeth. Also, teeth, both deciduous and permanent, are necessary for the correct sounding of words, i.e. speech.

A dental attendant may be a very effective aid in the programme of pedodontics. First, he may help materially by making friends with child patients and gaining their confidence and in that way assuring their co-operation when they are having their teeth filled. Also, he may explain to the parents in non-technical terms what the dental officer wants to do for their child and why it is important.

Satisfactory dental officer patient relationship begins when the patient walks into the clinic. The dental attendant is the one who greets the patient, and it devolves on him to create the right atmosphere. By his appearance and bearing, he should indicate to the patient that the clinic is conducted on a high plane of professional competence and efficiency. At the same time, he must display friendliness without loss of dignity. For the patient in pain, there must be sympathy as well as an assurance that the dental officer can and will relieve the pain.

All of this relates to the child patient as well as the adult. He must realize that the child, in his visits to the dental clinic, expects to be treated as an adult, but at the same time may need reassurance to a greater extent than an adult. In that connection, there is a very natural tendency to make promises that "it won't hurt", which the dental officer may not be able to fulfil. The dental attendant should avoid comments regarding pain, leaving that part of it to the dental officer. He can, however, assure the child that the dental officer will be extremely careful; also that he will have some very interesting things to show him.

Pedodontics is not always practised as an exclusive specialty; that is, pedodontists do not always limit their practices to dental care of children. This is because the techniques are basically those of general practice, being modified because of difference in the anatomy of the deciduous teeth.

Orthodontics, on the other hand, requires highly specialized techniques and a long period of study and experience to qualify the dental officer for its practice. For that reason, most orthodontists practice only that specialty and few dental officers who are carrying on general practice treat any but minor dental irregularities for their patients.

It was stated before, that premature loss of the deciduous teeth, especially the

molars, may cause irregularity of the permanent teeth. This is because the teeth adjoining the space where the tooth has been extracted move towards each other and, when this space becomes smaller, the permanent teeth cannot erupt properly and come in out of line or are impacted.

The same sort of movement occurs if permanent teeth are lost. The irregularity caused by the loss of permanent teeth may not be so noticeable as in the case of the deciduous teeth, unless this occurs in the front of the mouth. However, loss of the first permanent molar, disarranges the occlusion and alters the biting relationships of the teeth. This, in its turn, tends to weaken the alveolar bone and leads to periodontal disease. (See Section V.) That may not become evident, however, until later in life; hence the connection is not appreciated by the affected individual.

In cases where teeth, either deciduous or permanent, are lost and there is a likelihood that irregularity may result, it is often desirable to place, temporarily, an appliance known as a space maintainer, whose purpose is indicated by its name.

When irregularity occurs it is important that it be corrected if possible. Malocclusion may interfere with both mastication and speech. It may be a cause of periodontal disease. One of the most important results of malocclusion, in some cases, is its mental effect. Irregularity may make the individual self-conscious and may affect adversely employment and advancement.

Section V

DISEASES OF THE PERIODONTAL TISSUES

The periodontal tissues are those that surround the teeth. They are the alveolar bone, which provides the physical support for the teeth; the periodontal membrane, which retains and also cushions the teeth in their bony sockets; and the gingiva, or gum, which surrounds the tooth at its cervix and covers the cervical border of the alveolar bone or process.

Disease may attack either the gingiva or the alveolar process or both. The periodontal membrane will be involved by the extension of either type. The gingiva is subject to several diseases, most of which are inflammatory and which may therefore be called "gingivitis". The gingiva may also waste away at the cervix without inflammation; this process is known as "recession".

The alveolar process may waste away without, at first, any evidence of inflammation of the overlying gingival tissue. This wasting can be detected in the X-ray. After a time, the wasting away of the alveolar bone will be accompanied by inflammation of the overlying gingival tissue. This tissue then becomes separated from the tooth to which it was originally attached, creating a space or "pocket" between it and the tooth. As a result of the extensive gingival inflammation which occurs in such cases, pus forms in the pocket and can be squeezed out at the gum margin. This condition is known as suppurative periodontitis or "pyorrhoea". With the continued wasting of the alveolar bone, the tooth becomes loose and eventually falls out or must be extracted.

The above various diseases may attack teeth that are themselves sound, never

having had any dental decay.

Necrotic Gingivitis ("Trench" Mouth)

Of the inflammation of the gingivae, the most severe is an acute inflammatory condition to which a variety of names has been given at various times. Being very prevalent, in fact epidemic, during and after World War I, it was then known as "Trench Mouth", because it was supposed to have been contracted in the trenches. Actually, it may be contracted under any poor living conditions when the resistance of the body is lowest. A later and more technical name was Vincent's gingivitis, the name being taken from that of one of the infecting organisms. It is now widely known as "necrotic gingivitis", since the infective process causes a certain amount of necrosis or destruction of the gingival margin.

Causes of Gingivitis

The gingival tissue may be attacked by disease without involvement of the bone, at least for a time, and vice versa. Causes of each type should, therefore, be considered separately:-

1. Calculus or "tartar"

The classical cause of gingival inflammation is the deposition of calculus or tartar on the tooth surface in contact with the gum margin. Calculus is a hard substance containing compounds of calcium. It causes physical irritation of the gingiva and also harbours the bacteria which, in time, infect this tissue.

2. Lack of function

Stagnation of the blood in the gingival vessels, due to lack of vigorous use of the teeth and neglect of home care (tooth brushing), also results in infection and inflammation of the gingivae, because of lowered resistance.

3. Vitamin deficiency

Vitamin deficiencies, especially deficiency in Vitamin C, leads directly to gingival inflammation. These deficiencies may be a predisposing cause of necrotic gingivitis, of which, however, the active cause is infection by specific bacteria; the disease does not occur in the absence of those organisms.

4. Improper cleaning methods

Recession of the gingivae may be caused by improper cleaning methods, i.e., use of sand, charcoal, twig, etc.

5. Trauma

Wasting of alveolar bone is often caused by an improper "bite" or trauma of the teeth, which may occur in malocclusion, but is even found sometimes when the teeth appear to be quite regular.

This improper or uneven bite brings excess pressure to certain teeth, causing injury to the supporting bone. It is called "traumatic occlusion".

6. Infection

With wasting of the bone, the gingiva loses its support and may either recede without inflammation as noted before, or may become infected and inflamed, thereby leading to suppurative periodontitis. Wasting of alveolar bone may also occur as a secondary result of gingival inflammation and long-continued deposition of calculus. This form also results in suppurative periodontitis. Another form of direct infection has already been discussed (see "Necrotic Gingivitis").

Prevention of Gingival Disease

The means for prevention and treatment of periodontal disease will be suggested by consideration of the causes. Maintenance of the highest degree of cleanliness of the tooth surfaces, both by home care and by visits to the dental clinic for prophylaxis, form the foundation of the programme. Adequate intake of vitamin-bearing foods is also essential. Correction of traumatic occlusion, when found, is an important factor in both the prevention and the treatment of periodontal disease.

One of the most important and most common ways in which traumatic occlusion may develop is through failure to have missing permanent teeth replaced by appliances. When, for instance, a first permanent molar is lost, which sometimes occurs quite soon after it has erupted, the shifting of the other teeth which invariably occurs, brings about a re-distribution of stress on those teeth. Some of them will strike too hard as a result, and periodontal disease will eventually occur.

For people who are following a sound diet and who have a full set of teeth, reasonably regular in their alignment, regular and properly-directed mouth care at home is the best preventative of periodontal disease. Equally it is a pre-requisite to the maintenance of periodontal health after periodontal disease has been successfully treated.

In spite of the best home care, however, nearly every adult is subject to some deposition of calculus. This can only be removed by the trained operator. Maintenance of health of the periodontal tissues therefore requires, in addition to proper home care, regular prophylaxis by the dental operator.

Experience has shown that even the conscientious patient loses track of the time that elapses after prophylaxis has been given; hence the need for a recall system to be conducted in the dental clinic. The dental attendant will be charged with the responsibility of making recall appointments at the proper time. This task requires meticulous attention to the recall system in use at the dental clinic. His handling of this detail will be more intelligent and therefore more effective, if he understands something about the conditions the prophylaxis is intended to prevent or ameliorate.

Section VI

MICRO-ORGANISMS OF THE MOUTH

Micro-organisms (bacteria) of several different types are constant inhabitants of the mouth; many are harmless but a larger number are pathogenic (capable of producing disease). Dental officers are chiefly interested in the latter because of the disease conditions they cause, such as dental caries, gingivitis, and alveolar abscess. The most common pathogenic organisms may, for convenience sake, be grouped as follows:-

1. Lactobacilli
2. Staphylococci
3. Streptococci
4. Spirochaetes
5. Fusiform bacilli

1. The Lactobacilli are rod-shaped, among which is the lactobacillus acidophilus. This organism is considered by most authorities to be one of the important organisms responsible for dental caries. It is capable of producing acid which has the ability to dissolve the calcium salts of enamel. The process, known as decalcification, is believed to be the first step in the process of tooth decay. The lactobacillus is found in all tooth cavities and in the mouth fluids. Colony counts of these bacteria made from cultures grown in rinsings of the saliva are used as a test for determining the activity of decay. Counts of the organism are usually highest in mouths where there is active decay and generally lowest when the teeth are free from decay. It is believed that if the acidophilus count can be reduced (in the high count cases), further decay will be prevented or very markedly reduced.

2. The Staphylococci are ball-shaped organisms. They are the principal causative organisms found in acute inflammation such as the alveolar abscess. They gain access to the pulp from the mouth, through the cavity of the decayed tooth, and thence to the periapical tissues through the root canal. The staphylococci may cause a violent and extremely painful inflammation with swelling. When the swelling subsides by virtue of the establishment of drainage of the pus from the abscess, the staphylococci tend to be overgrown and often completely supplanted by the streptococci which gain access to the periapical tissue from the mouth by the same route.

3. The Streptococci are also ball-shaped organisms arranged in chains, and may cause acute inflammation, but they are characteristically found in areas of low-grade chronic infection. Because, in these latter inflammations the patient experiences no pain, there is no warning of the existence of the infection. One of the common sites of chronic streptococcal infection is the periapical region of the pulpless tooth. Here it may follow the acute infection caused by the staphylococci, as indicated in 2., or it may occur independently of such infection. Streptococci are commonly found in chronic gingivitis.

Secondary infections may produce serious disease, hence the dental officer has a definite responsibility to prevent or to eliminate infections, particularly caused by

streptococci, in the mouths of his patients. The dental attendant may play his part in the programme of control of infection through care in sterilizing instruments and dressings that are to be used by the dental officer and in intelligent chair-assisting while the dental officer is treating his patients.

4. There are several types of Spirochaete, corkscrew-like organisms that may occur in the mouth. Several are harmless, but two forms have pathogenic significance. One form, named after the discoverer, Vincent, is one of the causative organisms of necrotic gingivitis. It is found in large numbers in the debris from the inflamed gums in such cases. It may often be found also, but in smaller numbers, in mouths where there are no clinical signs of the disease.

The other important form of pathogenic spirochaete is known as Spirochaete Pallida, or Treponema; it is the causative organism of syphilis and will be present in the mouth lesions that may occur during the primary and/or secondary stages of that disease. A type of spirochaete is also associated with yaws.

5. The Fusiform bacillus, a rod-shaped organism with tapered ends, occurs in association with the Vincent spirochaete in cases of necrotic gingivitis.

Section VII

CONTROL OF INFECTION

STERILIZATION

Infection caused by pathogenic micro-organisms may be controlled in two ways. First, by preventing the access of the organism to susceptible tissues. Second, by destroying the organisms after they have reached such tissues. The first method is that practised in surgical operations; there asepsis (literally, absence of sepsis or infection) is achieved through sterilization of instruments and the hands of the dental officer, and also sterilization of the lining of the mouth into which the dental officer must cut.

The second method of controlling infection is by heat or cold, physical means, or by application of antiseptics, germicides and antibiotics of different types. Infections which have gained access to the body are, however, also controlled, under favourable circumstances, by defences generated within the body itself. This latter is called "natural control".

Control of Bacteria by Heat

Bacteria outside the body can be destroyed by heat, either in the form of dry or moist heat. In either case, certain temperatures must be developed and maintained for certain periods of time. Dry heat may be applied in an oven with temperature control. Moist heat may be applied by boiling in water or in oil brought up to suitable temperature, and also by super-heated steam. The usual surgical or dental sterilizer is an apparatus in which instruments are immersed in boiling water. To develop superheated steam it is necessary to have a closed chamber; in effect, a boiler, in which temperatures above that of boiling water may be attained. Such an apparatus is known as an autoclave, in which the super-heated steam is virtually dry,

and it may therefore be used to sterilize gauze and other surgical dressings which must be used dry.

Control of Bacteria by Cold

Bacteria may be partially controlled by cold. That is:- at low temperatures bacteria do not multiply nor do they act on substances with which they are in contact. Refrigeration of food is an example of such control. Refrigeration in the form of ice packs is sometimes resorted to, in an effort to control or minimise certain infections encountered in the accessible parts of the body.

Control of Bacteria by Drugs

Antiseptics, germicides, and anti biotics are chemical agents for controlling infection. The first chemical used purposely for the control of infection was phenol (carbolic acid). In full strength it is a germicide, that is, it kills micro-organisms. When diluted with water it no longer destroys bacteria but does inhibit their growth; it is then known as an antiseptic.

Since the discovery of the germicidal potency of phenol, many other agents have been developed and tried. Unfortunately, most agents used in the past, that had antiseptic or germicidal powers, were also more or less injurious to the body tissues, hence their usefulness was limited.

The discovery of sulphanilamide marked a very long step forward, since this drug and its related compounds are quite well tolerated by the body and have a distinct ability to limit and control infection. Sulpha drugs limit the multiplication and activity of bacteria but do not destroy them. They hold bacteria in check, as it were, and give the natural body defences an opportunity to destroy them.

More effective still are the more recently discovered agents of which penicillin, streptomycin and aureomycin are the most prominent examples. These are the pure growths of certain moulds, which actually destroy certain micro-organisms and are tolerated by the body better than the sulpha drugs. They are called anti-biotics.

All these various agencies for controlling infection are used by dental officers, some for the care of their instruments and dressings, others in the treatment of the infections found in their patients' mouths.

STERILIZATION

Sterilization by Heat

For the sterilization of instruments, the usual procedure is immersion in boiling water in a sterilizer. Boiling for fifteen minutes is the time needed for the destruction of the bacteria commonly found in the mouth. Since boiling water tends to corrode steel instruments, and thus will affect the cutting edges of excavators, chisels, and scalers, attempts have been made to find chemicals that could be dissolved in the water and which would prevent rusting and corrosion. Bicarbonate of soda is commonly used for this purpose, a teaspoonful to a pint of water. However, even with this, production of some discolouration is apt to occur. For other instruments, such as forceps, and for matrix retainers and similar appliances, boiling is entirely satisfactory. (Bicarbonate of soda cannot be used if aluminium appliances are boiled, as alkalis corrode aluminium).

Cold Sterilization

Many dental officers prefer to use what is known as cold sterilization for their excavators and other cutting instruments. Cold sterilization is the immersion of instruments in a solution of a germicide, one which will not corrode or rust the instruments. Care must be taken to see that the instruments are completely covered by the solution. Instruments should be handled with suitable forceps and the instruments rinsed in sterile water after removal from the solution, and wiped on a sterile towel.

Among the more efficient germicides are solutions of the cresols. Dettol is the cresol solution most commonly used for cold sterilization.

Instruments must be cleansed by vigorous scrubbing under running water before being sterilized; blood, mucus from saliva, and other debris left on the instruments after use in the mouth will preclude complete sterilization and cause rusting.

After instruments, dressing, etc., have been sterilized, they should not be handled unless the dental officer's hands have been previously scrubbed with soap and water.

Trays into which sterile instruments are to be placed should be sterilized first.

Special precautions are necessary for instruments used in the extraction of teeth, and instruction in these should be given by the dental officer as a practical demonstration.

Special precautions are also needed for instruments and dressings to be used in root canal treatment and filling. The entire procedure of root canal treatment demands the utmost in asepsis so that not only may the canals be rendered sterile, but that new infection may be excluded from them.

General Precautions

It must constantly be remembered that bacteria are ever present in the air, on the surface of the body, on clothing, furniture, etc. Ordinary cleanliness does not sterilize; for example, a white enamel cabinet may be spotless and yet harbour on its surface untold numbers of bacteria. Cleanliness plus an effective germicide is required to produce sterility.

Because it is so difficult to render the hands completely sterile, dental officers often feel that it is advisable to wear sterile rubber gloves while performing surgical operations. Whether gloves are worn or not, after the hands have been sterilized, the dental officer cannot properly touch any implement that has not been sterilized. For this reason, the dental attendant must stand by to make any necessary changes in chair adjustment, or to perform any other needed services. He, on his part, since his hands are not ordinarily sterilized, must not touch any sterile instrument or supplies during the treatment or operation.

- N.B. 1. For further detailed information and instruction for dental attendants on sterilization, refer to the Lecture Notes for Dental Officers.
2. For detailed instruction in records and information relating to lists of equipment and instruments, their use and care, refer to the lecture notes prepared by the dental officer.
 3. Simple notes should also be prepared for Dental Attendants on the drugs commonly in use in the Service, for example:-

DEMULCENTS

Demulcents are substances which protect and soothe mucus surfaces.

GLYCERINE - GLYCERINUM

Materia Medica

Source: Obtained from fats

Characteristics: Clear, colourless, hygroscopic syrupy liquid with a sweet taste.

Solubility: Freely soluble in water or alcohol.

Therapeutics

Glycerine has the following uses:-

- a. As a vehicle for applying drugs to the skin or mucous membrane, e.g., application of glycerine and borax to the oral tissues in treatment of thrush. The glycerine is readily absorbed by the mucous membrane and carries with it the substance (borax) dissolved. Use 1 part of borax to $6\frac{1}{2}$ parts of glycerine.
 - b. As a vehicle for pumice or other polishing powders, as when polishing fillings and the teeth.
 - c. In treatment of carbolic acid burns. Glycerine is applied to neutralize the caustic action of the carbolic, e.g., burns on the lips or oral tissues.
 - d. As an application to cracked or dry lips before carrying out dental operations. Its effect here is partly as a lubricant.
-

APPENDIX II

STANDARD LISTS

OF

CONSUMABLE AND NON-CONSUMABLE

STORES

FOR

1. DENTAL OFFICER WITH PROSTHETICS
TRAINING
2. DENTAL OFFICER
3. DENTAL HYGIENIST
4. DENTAL TECHNICIAN

N.B. The numbers (1, 2, 3, 4, as
referenced above) in column
(1) before items listed in
column (2) indicate to what
category of officer the item
should be made available.

STANDARD LISTS OF DENTAL STORES

SECTION A - DRUGS AND EXPENDABLE MATERIALS

(CONSUMABLE ITEMS)

Category of Officer	Official Description of Item	Unit of Measurement	Quantity in which Supplied
(1)	(2)	(3)	(4)
12	Aconite, Tr.	oz.	2 oz. bottles
123	Acriviolet	oz.	2 oz. bottles
1 4	Acrylic, Cold-Curing, Stellan	box	boxes
1 4	Acrylic Pink, Stellan	pack	packs
1234	Adhesive Plaster, 3", 5 yd. Z.O.	roll	rolls
1 4	Albastone	tin	7 lb tin
1234	Alcohol	oz.	8 oz and 16 oz bottles
12	Alloy, Silver	bottle	5 oz. bottles
123	Amosan	bottle	4 oz. bottles (Standard size)
12	Amalgam, Copper	oz.	3 oz. bottles
123	Anaesthetic Xylocaine	tin	tin of 50 anaestubes 1.8 c.c.
123	Applicator, Wooden	box	boxes of 500 applicators
1234	Articulating Paper	book	books
1 4	Asbestos Discs and Rolls	No.	No.
4	Band, Arbor, Sandpaper	box	boxes
4	Bars, Lingual	No.	No.
4	Bars, Palatal	No.	No.
1 4	Base Plates (Ash)	box	boxes
123	Battery, Torch for Headlamp	No.	No.
4	Blade for Copelan Saw	No.	No.
4	Blade for Fret Saw	No.	No.
123	Brushes, bristle cup, contra angle	pkt.	pkts of 6 brushes
123	Brushes, bristle cup, straight	"	"
123	Brushes, porte Polisher	"	pkts. of 12 brushes
4	Brush, Drawing, Small	No.	No.
123	Bulbs, Sparklet, "C" size	box	boxes
123	Bulbs, Torch for Headlamp	No.	No.
<u>BURS</u>			
12	Fissure Miniature		
	Size 1	pkt	pkts of 6 Burs
	Size 2	"	" " " "

(1)	(2)	(3)	(4)
	<u>BURS</u> (Contd.)		
	Size 3	Pkt.	pkts of 6 Burs
	Size 4	"	"
12	Fissure, Contra Angle	"	"
	Size 1	"	"
	Size 2	"	"
	Size 3	"	"
	Size 5	"	"
12	Fissure, Tapered, Fine Cut, Plain, Contra Angle No.601	"	"
12	Fissure, Tapered, Coarse Cut, Contra Angle, No.703	"	"
12	Inverted Cone, Miniature		
	Size 1	"	"
	Size 2	"	"
	Size 3	"	"
	Size 4	"	"
	Size 5	"	"
	Size 7	"	"
12	Inverted Cone, Contra Angle	"	"
	Size 1	"	"
	Size 2	"	"
	Size 4	"	"
	Size 5	"	"
	Size 6	"	"
	Size 7	"	"
	Size 8	"	"
	Size 9	"	"
12	Inverted Cone, Straight		
	Size $\frac{1}{2}$	"	"
	Size 1	"	"
	Size 2	"	"
12	Round Miniature		
	Size 1	"	"
	Size 2	"	"
	Size 3	"	"
	Size 4	"	"
	Size 5	"	"
	Size 6	"	"
	Size 8	"	"
12	Round, Contra Angle	"	pkts of 6 Burs
	Size 2	"	"
	Size 3	"	"
	Size 5	"	"

(1)	(2)	(3)	(4)
	<u>BURS</u> (Contd.)		
	Size 6	pkt	pkts of 6 Burs
	Size 8	"	"
	Size 9	"	"
12	Round, Straight		
	Size 1	"	"
	Size 2	"	"
	Size 3	"	"
12	Calcium Hydroxide	oz.	2 oz. bottles
12	Carbolized Resin	oz.	2 oz. "
12 4	Carborundum Points, Assorted	pkt	pkts.
12 4	Carborundum Stone	No.	No.
4	Cellophane	pkt.	pkts.
12	Cement, Copper	box	boxes
12	Cement, Zinc, S.S.W.	box	boxes
12	Cement, Filling, Porcelain	box	boxes
123	Chalk, Precipitated	oz.	8 oz pkts
1234	Cleaner, Paste, Bath	tin	20 oz tin
12	Cloves, Oil of	oz.	2 oz. bottles
1 4	Compound, Impression	box	boxes
1 4	Compound, Impression Tracing Sticks	box	boxes
1234	Cotton-wool	1 lb.pkts	1 lb. pkts
123	Cotton-wool Rolls	box	boxes of 500 rolls (Sizes- $\frac{1}{4}$ ", $\frac{3}{8}$ " and $\frac{1}{2}$ ").
123	Dettol	lb.	1 lb. bottles
123	Dettolin, Mouth-wash	bottle	bottles
4	Discs, Burlew (Rubber) Polishing Large Wheel	pkt	pkt of 25 discs
12	Discs, Polishing, Torit with brass Centres, assorted	box	$\frac{5}{8}$ " Fine, Medium Coarse. Boxes of 100 Discs
12	Discs, Paper, Moyco, assorted	box	boxes of 100 Discs
1234	Engine Oil	oz.	2 oz. bottles
12	Ethyl Chloride	bottle	4 oz. bottles
12 4	Eucalyptol	oz.	4 oz. bottles
12	Eugenol	oz.	2 oz. bottles
123	Face mask, disposable, paper	pkt	pkts of 100
4	Felt Cones, Large	number	number
4	Felt Cones, Small	"	"
1234	Fly Spray, Aerosol	can	cans
123	Gauze, squares, sterile, 3" x 3"	tray	tray of 80
123	Gauze	yd.	6 yd. lengths
123	Gentian Violet 2%	oz.	4 oz. bottles

(1)	(2)	(3)	(4)
123	Glycerine	oz.	4 oz. bottles
4	Gold, Casting, 22 Ct.	dwt.	2 dwt. pkts.
1	Gum, Tragacanth	oz.	8 oz. bottles
12	Gutta-Percha Temporary Stopping	box	boxes of 8 pieces
12	Haemostatic Agents (Calgitex & Gelfoam)	pkt	pkts
123	Handkerchiefs, paper	pkt	pkts of 100
123	Handpiece Cleanser and Lubricant	oz.	3 oz. bottles
4	Hydrochloric Acid, Concentrated	oz.	8 oz. bottles
123	Hydrogen Peroxide	oz.	4 oz. bottles
4	Investment Christobalite, with Asbestos Roll	tin	3½ lb. tins
123	Iodine	oz.	4 oz. bottles
123	Iodine, Churchill's	oz.	2 oz. bottles
1234	Kerosene	gall.	4 gall. drums
123	Labels, Gummed Medicament	set	sets
123	Lamp-Wick	number	number
4	Lathe Brush, Large, Black	number	number
4	Lathe Brush, Large, White	"	"
4	Lathe Brush, Small, Black	"	"
4	Lathe Brush, Small, White	"	"
4	Lathe Brush, Grinding Wheel, Medium Grit.	"	"
4	Lathe Brush, Grinding Wheel, Fine Grit	"	"
12	Liquor, Adrenalin Hydrochlor. 1/1000	c.c.	25 c.c. bottles
1234	Matches, Safety	box	boxes
12	Matrix band material	pkt	pkts of 3 pieces
12	Matrix, Bonnalie Band	pkt	pkts of 12 Bands assorted
12	Matrix, Lennox	pkt	pkts of 36 Bands
12	Mercury	lb.	1 lb. jars
4	Metal Relief Roll	pkt	pkt
1234	Methylated Spirits	gall.	1 gall. tins
1234	Mop, Calico	number	number
4	Mould Seal, Stellan	bottle	bottles
123	Needles, Hypodermic, 1 inch, Disposable "Monojet", 25 gage, Short (red).	needle	boxes of 100 or 250 needles
123	Needles, Hypodermic 1-5/8", Disposable "Monojet", 25 Gage, Long (red).	"	"
12	Needles, suture Pkt. No.3 Lanes, half-circle.	pkt	pkts of 2 needles
12	Nylon Floss, waxed	spool	spool of 150 yards
1 4	Paste, abrasive (for dentures)	tin	tins
1234	Petroleum Jelly	oz	2 oz. jars

(1)	(2)	(3)	(4)
4	Plaster of Paris	tin	40 lb. tin
123	Polishing cups, rubber	pkt	pkts of 10 cups
123	Potassium Permanganate	oz.	2 oz. jars
1234	Powder, Cleaning	oz.	12 oz. tins
4	Pumice (for polishing dentures)	oz.	12 oz. pkts
123	Pumice, Superfine	oz.	16 oz. pkts
4	Rouge	stick	sticks
12	Rubber-Dam	roll	rolls of 7½ ft.
123	Sal Volatile	oz.	4 oz. bottles
123	Saline Tablets	bottle	bottles of 100 tabs.
4	Sandpaper, fine	sheet	12 in. sheets
4	Sandpaper, medium	"	" " "
123	Savlon, Concentrate	oz.	8 oz. bottles
1	Scalpel Blades (Bard Parker)		
	Size 12	pkt	pkts
	Size 15	"	"
12	Sevriton Set, Complete	Set	Set
12	Silver Nitrate Solution	oz.	2 oz. bottles
1234	Silicone Barrier Hand Cream	jar	jars
1234	Soap Toilet	tablets	3 oz. tablets
123	Sodium Fluoride Tablets	tin	tins
12	Squeeze Cloths, Amalgam	pkt	pkts of 100
12	Strips, Polyester Film, (Strips, Celluloid)	boxes	boxes of 100 strips
12	Strips, (Hawe Strips "adapt" Medium Size).	"	"
123	Strips, Polishing Fine	box	boxes of 100 strips
123	Strips, Polishing Medium	box	"
12	Suture, Dermal	box	boxes
12	Tab. Cod. Co.	bottle	bottles of 500
12	Tape, Separating	hank	½ yd. hanks
1 4	Teeth, Artificial	set	sets
12	Thymozin	box	box
1 4	Tin, foil	pkt	pkts
1234	Toilet paper	roll	rolls
12	Varnish, Cavity	oz	1 oz bottles
4	Washing Soda	lb.	1 lb. pkts
4	Wax, Blue, Inlay Casting	box	boxes
1 4	Wax, Modelling, High Stability Ash	box	1 lb. boxes
1 4	Wax, Sticky	box	boxes
4	Wheel, Woolly	number	number
12 4	Whiting (for polishing dentures)	lb.	pkts of 5 lbs.

(1)	(2)	(3)	(4)
1 4	Wire Ligature S.S.	length	lengths
12	*X-Ray Film No.01, periapical 1 $\frac{1}{4}$ "x 1" super rapid	pkt	pkt. of 24 films (pairs)
12	*X-Ray Film, No.3, Occlusal 3" x 2 $\frac{1}{4}$ " super rapid	pkt	pkt of 12 Films (pairs)
12	*X-Ray Film, No.4, Standard, 1 $\frac{5}{8}$ "x 1 $\frac{1}{4}$ ", super rapid	pkt	pkts of 24 Films (single)
12	*X-Ray Film Developer, Kodak Liquid	container	20 oz. plastic container
12	*X-Ray Film Fixer, Kodak Liquid	container	20 oz. plastic container

* (please see Appendix, Page 7)

1	Zelgan, Impression Material	tin	15 impression tin
12	Zinc Oxide	oz	2 oz. jars
12	Zonalin (Accelerated Zinc Oxide)	box	boxes

APPENDIX

HOW TO USE KODAK LIQUID X-RAY CHEMICALS

The Kodak Liquid X-ray Chemicals supplied in the 20 oz. plastic containers are specially prepared solutions for dental x-rays. They have a lower fog level and produce a finer grain on the films than the solutions supplied in the 80 oz. plastic containers for standard X-ray work.

The solutions should be replaced at least at the beginning of each term. If wooden floats are placed on the surfaces of the solutions in the tanks when they are not in use, oxidation will be considerably slowed down, and the solutions will retain their efficacy for a longer period.

Officers are recommended to adopt this precautionary measure.

DEVELOPER

1 pint (20 ozs.) developer stock solution + 3 pints water + thorough stirring = $\frac{1}{2}$ gallon developer.

DEVELOPING TIMES

65°F (18°C)	2 $\frac{1}{2}$ minutes
68°F (20°C)	2 minutes
72°F (22°C)	1 $\frac{1}{2}$ minutes

IMPORTANT

After development rinse films in RUNNING water.

FIXER

1 pint (20 ozs) fixer stock solutions + 3 pints water at about 68°F (20°C) + thorough stirring = $\frac{1}{2}$ gallon fixer.

FIXING TIMES

Fix Films for twice the time taken for the film to clear. Minimum fixing time - 3 minutes - to ensure adequate hardening.

Maximum fixing time - 20 minutes.

DRAIN films on removal from fixer. Do not leave films in fixer for more than 20 minutes.

IMPORTANT

After fixing, wash films in running water for half-an- hour.

NOTE: Thorough stirring is essential when preparing solutions - the concentrates are very dense liquids and, when diluted, require energetic agitation to give homogeneous solutions.

SECTION B - EQUIPMENT AND NON-EXPENDABLE MATERIAL

(NON-CONSUMABLE ITEMS)

Category of Officer	Official Description of Item	Normal issue for One Officer
(1)	(2)	(3)
12	Amalgam balance	1
12	Amalgam burnisher, No.18	1
12	Amalgam carrier, Straight, Fig.5X, Complete	1
12	Amalgam carrier (plunger)	Spare parts
12	Amalgam carrier (plunger spring)	"
12	Amalgam carrier nozzle (screw-off end)	"
12	Amalgam carving instrument	1
123	Amalgam and cement plastic instrument blade ends (serrated handle) No.179	1
12	Amalgam plugger, contra angle, No.153S	1
12	Amalgam plugger, plain angle, No.154S	1
12	Amalgam plugger fissure No.151S	1
12	Amalgam Spoon	1
123	Artery forceps (Mosquito curved)	1
1 4	Articulator, anatomical	1
1 4	Articulator, straight line	2
12	Bag, hand, visiting	1
	Bag, laundry	1 each treat- ment centre
123	Bib-holder	2
123	Bib, patient	3
4	Blowpipe, Acetylene	1
123	Bodkin, engine	2 each foot engine
12	Bone, chisel	1
12	Bone, file	1
123	Bottle, medicament	8
123	Bowl, S.S., 3" dia.	1
123	Bowl, S.S. 6" dia.	3
1 4	Bowl, Mixing, rubber large, $4\frac{3}{4}$ " dia. x $3\frac{1}{2}$ " deep	1
4	Bowl, Mixing, Paribar	1
12	Box, Dental Travelling	1 each travel- ling equipment
12	Box, Dental Travelling padlock	2 each travel- ling equipment
	Boxes, History & Stock Cards	As many as required
	Broom, cane	1 each treat- ment centre
	Brush, banister	1 each treat- ment centre

(1)	(2)	(3)
12 4	Brush, bur, wire	1
	Brush, lavatory	1
1234	Brush, nail	2
	Bucket, S.S.	1 each treatment centre
	Bucket, plastic	2 each treatment centre
4	Bur, Acrylic	numbers
12	Bur basket	1
12	Bur, Finishing, Round I, contra angle	2
	" " " " straight	2
	Round G, contra angle	2
	" " " straight	2
12	Bur-holder	1
123	Cabinet, students'	1
	Canister, S.S. (with lid)	As many as re- quired
	Casting machine, Solbrig	1
12	Cement instrument No.2	1
12	Cement instrument plugger ends No.180F	1
123	Chair, dental, pump	1
	Chair, dental, cover	3
	Chair, dental, cushion	2 per chair
	Chair, office	5
	Chair, wooden, operating	3
12	Chisel, enamel (bin-angle) No.82	1
12	Chisel, enamel (straight) No.85	1
4	Chuck, arbor	1
4	Chucks, Lathe, set of 4	1 set
4	Clamps, 2-flask	3
	Clock, alarm	2
	Clock, wall	1
123	Cotton-wool holder	1
123	Cotton-wool roll clamps	1 set
12	Curette, S.S.W. D.E.Nos.85 & 86	1 of each
123	Dappen glass	2
	Dish, enamel, tray }	As many as required
	Dish, kidney }	
	Dish, S.S. tray }	
4	Dividers	1 pair
	Door mat, all weather	1 each treatment centre
	Door mat, coir	"
12	Drop bottle, mercury	1

(1)	(2)	(3)
1234	Duster, yellow flannelette Dustpan	4 1 each treatment centre
12	Elevator, periosteal, No.22	1
12	Elevator (left) No.21	1
12	Elevator (right) No.22	1
12	Elevator, straight, No.20	1
12	Elevator, root, Ash (straight) No.26	1
12	Elevator, root, Ash (left) No.27	1
12	Elevator, root, Ash (right) No.28	1
	Engine arm cable type	Spare Parts
	Engine arm duplex connection spring	"
	Engine arm, flexible casing, complete, No.10X	"
	Engine arm spring catch	"
	Engine arm spring catch screws	"
1234	Engine cord for foot engine, short, 8'2½"	"
	Engine cord for school electric dental unit (State model of unit i.e., B?)	"
	Engine, foot (complete)	As many as re- quired
	Engine, foot treadle spring, long	Spare part
12	Excavator, D.E. No.210/211	2
12	Excavator, D.E. No.214/215	1
12	Excavator, D.E. No.220/221	1
12	Excavator, D.E. No.204/205	1
1	Expansion Screws (Orthodontic)	As many as re- quired
123	Explorer, contra angle (left) No.2	1
123	Explorer, contra angle (right) No.2	1
123	Explorer, sickle	2
123	Explorer, straight	2
12	File, finishing	1
4	File, metal, fine ½-round, 4½"	1
1 4	File, Vulcanite, fine	2
1 4	File, Vulcanite, medium	2
1 4	Flask, Stellan	1
12	Forceps, dissecting toothed	1
123	Forceps, lifting	1 each treatment centre
12	Forceps, lower deciduous molar, No.161	"
12	Forceps, lower deciduous root & anterior, No.162	"
12	Forceps, lower permanent molar, No.73	"
12	Forceps, lower permanent molar, No.74N	"
12	Forceps, upper deciduous molar, No.158	"

(1)	(2)	(3)
12	Forceps, upper deciduous root, No.159	1 each treatment centre
12	Forceps, upper permanent molar, No.76H	
12	Forceps, upper permanent root, No.76N	"
12	Forceps, upper permanent, straight, No.107	"
12	Forceps, lower permanent, lower incisors, canines and bicuspid, No.75	"
12	Forceps, upper permanent root, No.111	"
12	Forceps, lower permanent No.144	"
12	Forceps, lower permanent molars, Cow-horn, No.86	"
12	Forceps, Rongeur	"
1234	Funnel, 6"	"
4	Furnace, Drying	1
	Glass, measure, small	2
	Hammer, utility claw	1 each treatment centre
123	Handpiece, contra angle, (Kavo).	2 each officer
	Handpiece, contra angle, bur latch (state whether Stero or Miniature)	Spare Parts
	Handpiece, contra angle, bur latch catch (state whether Stero or Miniature)	"
	Handpiece, contra angle, bur latch screws (state whether Stero or Miniature)	"
	Handpiece, contra angle, nose cap (Kavo).	"
	Handpiece, contra angle, spring catch (Kavo).	"
123	Handpiece, Straight	2
12	Hatchet, enamel, large (left) No.51	1
12	Hatchet, enamel, large (right) No.52	1
12	Hatchet, enamel, small (left) No.53	1
12	Hatchet, enamel, small (right), No.54	1
	Headlamp	1 each treatment centre
123	Headrest cover, plastic	3
	Imperlator, complete (for mixing toothpaste)	1
	Jar, dressing, with lid S.S., 4" x 4"	As many as required
	Jug, electric	1 (main treatment centre)
	Kettle	1
4	Knife, plaster	2
1 4	Knife, wax, wooden handle (Dr Fahnstock)	1
123	Lamp, spirit, glass (with cover)	2
123	Lancet	1
4	Lathe, carborundum wheel	2
4	Lathe, Sterling	2 (main treatment centre)

(1)	(2)	(3)
4	Mallet, horn	1
12	Mallet, surgical, metal	1
12	Mandrel, contra angle, Fig.348	1
12	Mandrel, contra angle, Fig.334	1
12	Mandrel, Straight, Fig.303	1
12	Mandrel, porte polisher contra angle, Fig.233A	1
12	Mandrel, porte polisher Straight, Fig.233A	1
12	Mandrel, straight, Fig.348	2
12	Mandrel, straight, Fig.334	1
4	Mat, asbestos, wire	2
123	Mat, rubber, operating	1
12	Matrix Bonnalie	1
12	Matrix, Ivory	1
12	Matrix, Lennox Clamp	1
12	Matrix, Lennox key	1
4	Metal bars for strengthening dentures	As many as required
123	Mirror, hand, 3" x 2"	1
123	Mirror, mouth, handle	2
123	Mirror, mouth, head, plane	4
	Mixing vessel, Stellan	1
	Model, trimmer, "Eezicut"	1
	Mop, water	1 each treatment centre
12	Mortar, amalgam	2
123	Mug, S.S.	3
1234	Oil-can	1
1234	Oilstone	1
	Operating gown hospital type, small, medium, large	On personal charge as authorised by senior dental officer
4	Pan, polishing lathe	2
12	Pestle, amalgam	2
	Pint measure, enamel	2
	Pint (two) measure, S.S.	4
12 4	Pliers	1
1 4	Pliers, pin roughening and bending	1
	Poster frame	4 each treatment centre
123	Pot, medicament	2
4	Press, flask, (for two flasks)	1
	Rags, cleaning	A supply each treatment centre
123	Retractor, cheek	1
1	Root canal, broach holder, No.4, stainless steel	1

(1)	(2)	(3)
4	Ring, casting, 1 $\frac{1}{4}$ "	2
12	Rubber-dam clamp molar, 7A	1
12	Rubber-dam clamp pre-molar 2A	1
12	Rubber-dam clamp forceps	1
12	Rubber-dam holder	1
12	Rubber-dam punch	1
12	Rubber-dam weights	2
123	Saliva ejector (child)	2
123	Saliva ejector (adult)	2
4	Saw, Copelan	1
4	Saw, fret	1
123	Scaler, assorted	As many as re- quired
12	Scalpel, handle (Bard-Parker, No.3)	1
1234	Scissors	2
12	Scissors, Crown & Collar, Fig.9, curved chromium-plated.	1
4	Scrapers, Dentures	6
123	Screwdriver, engine	1
	Screwdriver, general purpose	1 each treatment centre
12	Separator, Ivory	1
12	Slab, glass, mixing cement	1
12	Slab, glass, mixing silicate	1
	Spanner for foot engine	4
12	Spatula, agate or bone	1
12	Spatula, stainless steel	1
12	Sponge holder	1
123	Spray, De Vilbiss Pattern No.15	1
123	Spray, Sparklet	1
	Sterilizer	As many as re- quired
	Sterilizer, basket	"
	Sterilizer, electric	2 (Main treatment centre)
	Stool, wooden	1 each treatment centre
123	Stool, operating	1
	Stove, pressure single-burner ("Primus" type)	As many as re- quired
4	Spoon, plaster, all-metal	2
4	Sprue, former	2
123	Syringe, Chip, bulb, (black)	2
123	Syringe, Chip, nozzle	1
12	Syringe, hypodermic, cartridge	3

(1)	(2)	(3)
123	Syringe, water, all-metal	1
123	Syringe, water, bulb, (red)	2
123	Syringe, water, nozzle	1
123	Table, Allen	1
123	Table, instrument (aseptic)	1
123	Table, office, 2-drawer	1
4	Tongs, for casting rings	1
	Toothbrushes	As many as re- quired are to be obtained
1	*Trays, impression assorted	number
123	Tray, instrument stainless steel	6
4	Tripod stand	1
123	Tumbler, plastic	2
1234	Tweezers, college	2
4	Tweezers, soldering	2
	Unit, dental, electric	No. required
	Unit, dental, electric, portable	{ 1 to be ordered for mobile when power available & 1 for main clinic when required
	Wastepaper basket	1 each treatment centre
123	Waste receiver	1
12 4	Wax carver, Ward's, No.1	1
	Wrench, crescent, 10"	1 each treatment centre
	X-ray apron, for patients	1 main clinic only
	X-ray dental developing tanks, set of 3	1 set
	X-ray film clip single	3
	X-ray film holder with 10 clips	6
12	X-ray unit	1

* See Ash Catalogue, List "J", 1964

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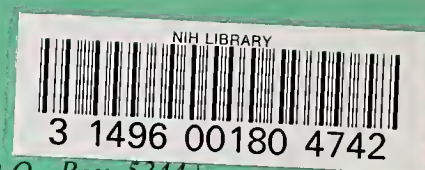
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